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Investing across Borders with Heterogeneous Firms

Do FDI-specific Regulations Matter?

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Abstract

This paper revisits the institutional determinants of foreign direct investment (FDI) using a comprehensive new data set on the regulations that govern FDI in more than 80 countries. It exploits the presence of confirmed zero investment flows between countries to estimate productivity cut-offs of firms that invest abroad profitably. This approach corrects likely biases arising from firm heterogeneity and country selection in a theoretically derived gravity-type model. The analysis finds inward FDI to be highly responsive to cross-country variation in specific institutional provisions, such as arbitration of disputes and legal procedures to establish foreign subsidiaries. The importance of FDI-specific provisions stands out even after controlling for the general quality of institutions. Statutory openness to FDI, however, has no association with actual inflow of investment. These results are found to be robust to different specifications.

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INVESTING ACROSS BORDERS WITH HETEROGENEOUS FIRMS: DO FDI-SPECIFIC REGULATIONS MATTER?

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ACRONYMS

ASEAN Association of Southeast Asian Nations

BIT Bilateral Investment Treaty

BRIC Brazil, Russia, India, and China

CES Constant Elasticity of Substitution

COMTRADE Commodity Trade Statistics Database

DWH Durbin-Wu-Hausman

FDI Foreign Direct Investment

GDP Gross Domestic Product

ICRG International Country Risk Guide

IAB Investing Across Borders

NLS Non-linear Least Squares

OLI Ownership-Location-Internalization

OLS Ordinary Least Squares

PCA Principal Components Analysis

PPML Poisson Pseudo Maximum Likelihood

US United States

WDI World Development Indicators

WGI World Governance Indicators

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INVESTING ACROSS BORDERS: DO FDI-SPECIFIC REGULATIONS MATTER?

> "Happy families are all alike;
> every unhappy family is unhappy in its own way."
> – Lev Nikolayevich Tolstoy, *Anna Karenina*, 1878

1.1 INTRODUCTION

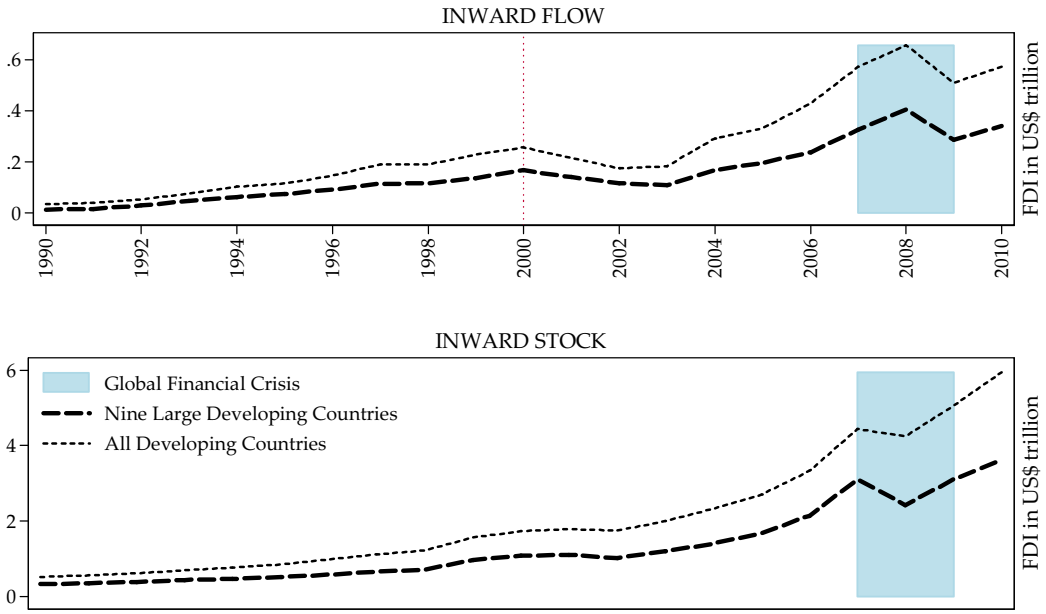
Foreign Direct Investment (FDI) remains one of the most important forms of cross-border capital flow into developing countries: in 2009, FDI inflow amounted to more than US$510 billion, exceeding inward remittance (US$307 billion) and development aid (US$91 billion).[1] As shown in Figure 1, however, just nine countries have accounted for about 60 percent of FDI inflow into developing countries over the past decade.[2] In an era when almost all countries in the world welcome FDI, allowing an average foreign equity ownership of 90 percent across all sectors (Table 22), this cross-country asymmetry deserves explanation that is beyond the obvious such as countries' sizes and growth prospects.

In this paper, I focus on the policy and institutional determinants of FDI using a new cross-country data set, Investing Across Borders (IAB) 2010, drawn from World Bank Group (2010). The data set consists of indicators of FDI regulation that

1 The figures on FDI, remittances, and development aid are from UNCTAD (2011), World Bank (2010), and World Bank (2011), respectively.

2 With the onset of the global financial crisis in 2007, FDI inflow into developed countries fell from a peak of US$1.31 trillion in 2007 to US$602 billion in 2009, whereas the more modest fall in developing countries occurred with a lag of one year, from a peak of US$658 billion in 2008 to US$511 billion in 2009. FDI flow increased rapidly from 1990 onward reaching the first peak of US$1.4 trillion in 2000. There was a dip in 2003, which is attributed to the drop in the share prices of high-technology companies (Helpman 2011). According to UNCTAD (2011), total FDI stock globally stands at a record US$19.1 trillion as of 2010.

Figure 1: FDI Inflow into Developing Countries



Source: UNCTAD World Investment Report 2011
Note 1: Nine countries are Brazil, Russia, India, China, Mexico, Argentina, Indonesia, Turkey, South Africa
Note 2: China includes Hong Kong & Macao

specifically measure each country's i) openness to foreign investment by sector; ii) quality of institutions related to resolving investment disputes; and iii) time, procedures and rules required to set up wholly foreign-owned subsidiaries. These FDI-specific indicators are the most comprehensive to date in terms of topics and countries, and they obviate the need to rely on proxy indicators for policy openness or the quality of institutions.

I also adopt a new methodological approach that corrects for two major biases prevalent in standard gravity models of FDI.[3] The first one arises when limiting the sample to only those countries that actually have an investment relationship with each other and excluding those that do not. This is a problem of country selection induced by zero bilateral flows. The second bias arises when firms are not differentiated by their ability to meet the fixed costs of investing abroad. This

3 Gravity models predict that bilateral flows such as trade, investment, and migration depend positively on economic pull such as Gross Domestic Product (GDP) of both home (exporter) and host (importer) countries, and negatively on frictions such as distance and policy barriers. For more on gravity models, see Bergeijk & Brakman (2010).

is the problem of firm heterogeneity. The two biases are linked when zero flows are caused by the fixed cost of investing abroad, and only the more productive firms meet such costs.

I build on the insight of the new trade literature that firms are heterogenous *within* industries in terms of productivity, size, use of inputs, and wages.[4] This translates into distinct decisions by firms (that co-exist within a narrowly-defined industry) on whether or not to export, or undertake FDI, or just serve the domestic market (Greenaway & Kneller 2007; World Trade Organization 2008; Helpman 2011). When profits are a function of varying productivity and differing fixed costs, Helpman et al. (2004) show that there is a natural sorting of firms, with the most productive self-selecting to undertake FDI. The next tier serves the foreign market through export, and the least productive serve the domestic market only (Appendix B).[5]

The earlier generation of "new" trade models that integrated economies of scale and monopolistic competition was a breakthrough in understanding a new source of comparative advantage (Helpman 2011). However, they addressed neither heterogeneity nor country selection. In particular, the assumption of symmetry in firm size and productivity leading to a prediction that all firms export to all countries is not supported by evidence at the firm level.[6]

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4 The seminal paper of this new literature is Melitz (2003). He explains why only a fraction of firms export and why exporters are larger and more productive than non-exporters. Note, though, in the Melitz model, all firms pay the same wage. This model has generated a vast empirical literature on firm-level approach to international trade. It has also been applied to study the quantitative effects of simulated trade policy reforms (for a recent work, see Balistrery, Hillberry and Rutherford, 2011).

5 This is supported by data. Helpman et al. (2004) show for US manufacturing firms across 52 sectors and 38 countries that multinational enterprises had 15 percent more labor productivity than exporters in 1994; exporters were 39 percent more productive than non-exporters. Girma et al. (2004), Girma & Pisu (2005), and Arnold & Hussinger (2005) all find significant productivity differences between firms that invest abroad and those that do not. Chen & Moore (2010) find in the case of French multinational firms that those with low productivity are less likely to invest in host countries with a small market size, high production costs, or low trade costs.

6 The new trade models of the 1980s successfully explained the phenomenon of intra-industry trade as caused by product differentiation on the part of firms operating under economies of scale. However, firms were assumed to be symmetric. All of them traded, but only the volume depended on trade costs. In other words, trade costs affected only the intensive margin (the volume of export per firm), not the decision of whether to export in the first place.

The paper proceeds as follows. Section 2 describes the relevant literature on the determinants of FDI, highlighting the institutional drivers on which the paper builds. Section 3 sketches the theoretical derivation of a gravity-like model for FDI and its empirical extension. Section 4 introduces the data. Section 5 explains the econometric method used to incorporate firm heterogeneity and redress country selection bias. Section 6 shows the main results by comparing benchmark estimates with those obtained after correcting for biases. Section 7 uses alternative dependent and explanatory variables to check for robustness of results. The final section concludes.

1.2 RELATED LITERATURE

Three sets of literature address why and where firms choose to serve foreign markets by setting up foreign subsidiaries, and not through export or licensing arrangements. The first (and early) batch of literature emphasized that firms with ownership advantages have an incentive to become multi-national as they seek to internalize their proprietary assets (technology, brand, distributional efficiency) while exploiting location-specific advantages such as market size or access to factors of production. This is the Ownership-Location-Internalization (OLI) paradigm (Dunning 1977). OLI is seen as a "big-tent" paradigm as it has evolved since 1973 (when it was first introduced) to cover new ideas and practices in international business, including joint-ventures (alliance capitalism) and the internet.

Helpman (2011), however, views the OLI paradigm as too broad for the construction of a theory with sharp predictions. He highlights a more focused study of Internalization through three different lenses: the first is the transaction cost economics of firm boundaries; the second is the managerial incentives analysis of internalization; and the third is the property rights approach that builds on the theory of incomplete contracts. Firm-specific intangible assets are subject to market failures (such as information asymmetry) and because full rents cannot be appro-

priated on assets through arrangements with third parties, firms internalize the market transaction by establishing their own subsidiaries.[7]

The second set of literature attempts to account for the long-term determinants of FDI in a general equilibrium framework. Helpman (1984) proposed the vertical model of FDI where a firm fragments production of differentiated final goods at locations that are abundant in factors used intensively in a specific phase of production. The headquarters specialize in research and development, and production occurs at locations with competitive factor costs. This model predicts that FDI occurs between countries that are differently endowed.

Markusen (1984) proposed a horizontal model where firm-level scale economies drive FDI, which explains a large share of FDI across countries with similar factor endowments. Firms produce the same product at multiple locations with the aim of serving local markets directly rather than through exports. Brainard (1997) finds that such FDI, relative to exports, is increasing with higher trade costs, decreasing with investment barriers, and decreasing with scale economies at the plant level.[8]

Although the typology of FDI as either horizontal (market-seeking) or vertical (efficiency-seeking) is neat, most multinational firms today combine vertical and horizontal models of FDI. Markusen (1997) calls this a knowledge-capital model, in which activities are split across geography based on differing skill intensities. At the same time there are multiple production units of the same good taking advantage of non-rivalrous intra-firm assets.[9] Yeaple (2003) presents a model of why

7 Within subsidiaries, Lerner & Schoar (2005) find that investors in countries with weaker legal provisions for complex contract enforcement are more likely to insist on majority ownership and control of the board, even if such investments have lower valuation and returns. They contrast common and civil legal regimes in the degree to which complex contracts on cash flow and control can be assigned to different parties. Common law allows complex contract contingencies that allow investors to shift control rights depending on performance. Under civil law, control often has to be exercised through majority ownership. Lerner and Shoar (2005) show that this leads investors to opt for convertible preferred stock in common law countries, and common stock or debt in civil law countries.

8 In Brainard (1997), *all* firms make the same choices of either exporting or undertaking FDI. Contrary to the framework of Helpman et al. (2004) exports and FDI do not co-exist in the same industry.

9 The vertical model suggests that trade and FDI are complements; the horizontal model suggests they are substitutes; and, loosely, the knowledge-capital model suggests that trade and FDI tend to be substitutes for similar countries and complements for those with different factor proportion.

firms may choose "complex integration" of both horizontal and vertical motivations for FDI.

The third set of literature takes a partial equilibrium approach by looking at exogenous and policy factors that affect the magnitude of FDI, not whether FDI takes place in the first place or not. It explores the role of exchange rates, trade protection, taxes, agglomeration, and the quality of institutions, among others, as driving the magnitude of FDI (Blonigen 2005).

The empirical part of this paper, which is in the partial equilibrium tradition, focuses on the institutional determinants of FDI. I am mainly concerned with poor economic institutions that constrain human behavior by distorting incentives. This includes weak rule of law, limits on private ownership, expropriation risks, lack of enforcement of contracts, poor provision of public goods, over-regulation, and high costs of doing business whose cumulative effect is to deter entrepreneurship. Poor institutions also contribute to an indifferent quality of public goods that discourage investment, domestic or foreign. The challenge in this literature has been to find appropriate measures of the quality of institutions.[10]

One of the first papers to explore the effects of policy and institutional quality on FDI is Wheeler & Mody (1992). They consider a list of 13 variables to represent institutional quality ("risk"), and nine variables to represent openness, and show both risk and openness to be insignificant determinants of FDI. Wei (2000) and Wei & Shleifer (2000) find that corruption and tax rates on multinational firms affect inward FDI negatively. While firms may voluntarily choose not to invest in highly corrupt countries, all else being equal, Hines (1995) finds that legislation at source can be a deterrent: the passage of the Foreign Corrupt Practices Act of 1977 in the United States led to a decline in American investment in bribe-prone countries.

In the international business literature, Dunning (1993) summarized four motives for FDI: market seeking, natural resource seeking, efficiency seeking, and strategic asset seeking.

10 In the economics literature, the primary focus is on market-creating institutions such as the protection of private property and the rule of law (Rodrik et al. 2002). *The Economist* argues that there is no consensus on what the rule of law constitutes (The Economist 2008).

Stein & Daude (2002) and Daude & Stein (2007) use a broad set of "institutional" variables to find that regulatory burden is an important determinant of FDI location. They draw on a wide range of sources: i) World Governance Indicators (WGI) developed by Kaufmann et al. (2010); (ii) International Country Risk Guide (ICRG) variables on the risk of repudiation of contract, risk of expropriation, corruption, rule of law, and bureaucratic quality; (iii) La Porta et al. (1999)'s index of shareholder rights, and (iv) World Business Environment Surveys on taxes and regulations, policy instability, and corruption.

Bénassy-Quéré et al. (2007) use 2001 survey data from the French Finance Ministry to find that effective bureaucracy and low corruption, among others, attract FDI. Kinda (2010) brings to bear firm-level data to find that institutional problems, together with poor infrastructure and financing constraints discourage FDI in a sample of 77 developing countries. Mottaleb & Kalirajan (2010) use panel data from 68 low-income and lower-middle income developing countries to show that open countries that rely on trade, have large GDP, high growth rate, and are business-friendly tend to be more successful in attracting FDI.

Alfaro et al. (2008) explain the "Lucas Paradox" of inadequate capital flows from rich to poor countries. Despite rates of return being higher in countries where capital is scarce, they argue that poor countries do not receive investment from abroad because of institutional weaknesses. But there are exceptions. Fan et al. (2009) attribute record inflow of FDI into China in recent decades, in spite of the indifferent quality of the country's institutions, to its stewardship of sustained economic growth.

While this literature confirms the salience of specific institutional variables, it suffers from limitations relating to model mis-specification and variable mis-measurement. The studies mentioned above do not address the problem of sample selection that arises when the pairing of FDI-sending and receiving countries does not occur randomly. They do not incorporate firm heterogeneity in a cross-national

framework. And they associate FDI inflow with *general* quality of institutions, not quality that is *specific* to FDI.[11]

Bergstrand and Egger (2009) summarize the vast literature on the theoretical and empirical foundations of gravity models of trade and FDI. I am, however, not aware of any paper that addresses the three problems mentioned above in a study of the institutional determinants of bilateral FDI. As already mentioned, I use new data on regulations that are specific to FDI and the new empirical methodology that has been applied to export flows by Helpman et al. (2008).

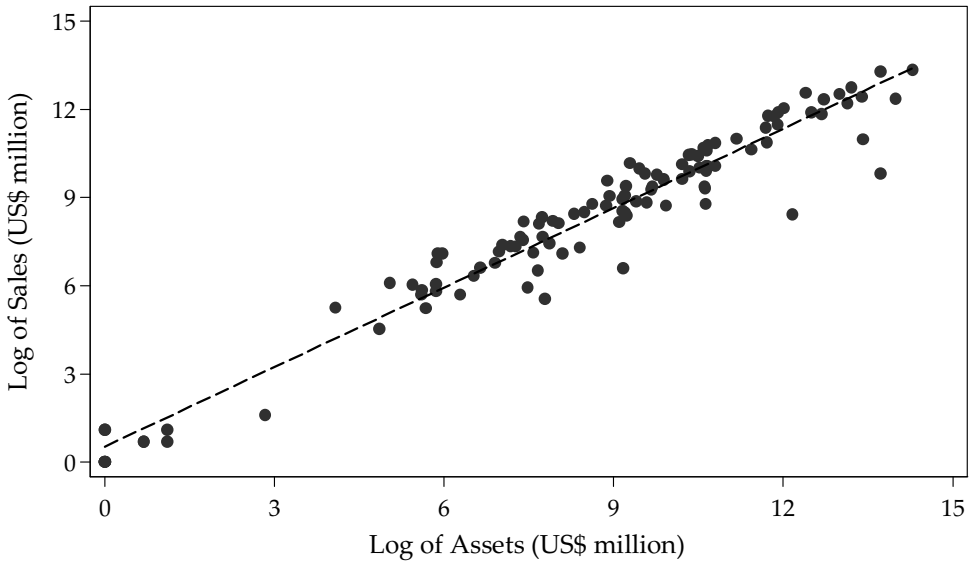
Central to the paper's methodology is the exploitation of the presence of zero flows between trading partners to estimate productivity cut-offs of firms that export abroad profitably. In trade, zero flows inferred from databases like the United Nations Commodity Trade Statistics Database (COMTRADE) are flawed because unreported figures are conflated with confirmed zeros. Baranga (2009) estimates that roughly 20 percent of the sample used by Helpman et al. (2008) has been misclassified. In contrast, the database – OECD (2011) – that I use for FDI clearly distinguishes between missing and zero flows between investment partners. This greatly enhances the appropriateness of the use of the new methodology in this paper.

1.3 MODEL

The model is adapted from the gravity-type trade model of Helpman et al. (2008) and Anderson & Van Wincoop (2003). The derivation of the model – for FDI – is detailed in Appendix A. A representative consumer prefers variety (v) and maximizes a Constant Elasticity of Substitution (CES) utility function $U = [\int x(v)^{\rho} dv]^{1/\rho}$ subject to aggregate expenditure (E). All varieties have a constant demand elasticity, $\sigma = \frac{1}{1-\rho} > 1$. A firm in country i produces one unit of output with a

11 One exception is Wei & Shleifer (2000), but they acknowledge their coding of incentives and restrictions on FDI to be coarse and limited to less than 50 countries.

Figure 2: Assets and Sales by US Affiliates, 2008



Source: US Bureau of Economic Analysis (www.bea.gov)
Note 1: Correlation coefficient is 0.97
Note 2: Affiliates are majority-owned US companies

cost-minimizing combination of inputs $(c_i a)$ where a indexes firm-specific productivity and measures the number of bundles of the country's inputs used per unit of output; c_i is the cost of the bundle which is uniform across country i. Firms maximize profit, and do not interact strategically with each other.

Multinational firms from home country i sell goods through subsidiaries and face price and demand in host country j. Serving the foreign market through FDI (instead of exports) reduces transport costs, but adds non-trivial coordination and transaction costs represented by τ_{ij}^f, in addition to the fixed cost (f_{ij}^f) of setting up a new plant which is assumed to exceed the fixed cost of exporting (f_{ij}^e). (Serving country j through exports instead would involve exogenous trade and transport costs, τ_{ij}^e, but lower fixed cost. It is assumed that $\tau_{ij}^e > \tau_{ij}^f$ and $f_{ij}^f > f_{ij}^e$.)

There is a wedge between the price of each variety in country j and country i represented by bilateral mark-up and transaction costs, so $p_j = \frac{\tau_{ij}^f c_j a}{\rho}$. Firm productivity is assumed to be Pareto distributed with support $[a_L, a_H]$ and only firms

with productivity a_{ij} such that $a_L < a_{ij} < a_H$ undertake FDI without incurring a loss. The profit condition (revenue over demand elasticity net of fixed costs) yields the cut-off productivity level as follows:

$$a_{ij} = \left[\frac{Y_j(1-\rho)}{c_i f_{ij}^f}\right]^{\frac{1}{\sigma-1}} \frac{\rho P_j}{\tau_{ij}^f c_j} \tag{1.1}$$

The cumulative distribution function of firm productivity is $Pr(a < a_{ij}) \equiv G(a_{ij}) = \frac{(a_{ij})^k - a_L{}^k}{a_H{}^k - a_L{}^k}$ where k is the shape parameter such that $k > \sigma - 1$. The distribution of firm productivity $G(a)$ is common across countries ex ante, but ex post $G(a_{ij})$ is the distribution of a in country i conditional on the firm investing in country j.

Total FDI[12] from i to j is $\int_{a_L}^{a_{ij}} p_j x_j N_i dG(a)$ where $G(a_{ij})$ is multiplied by the number of firms N_i which proxies for country i's economic size. Investment can increase on either the extensive or the intensive margin. If demand or policy costs in country j are constant, the only way investment can increase is through an exogenous productivity shock in country i allowing an increased fraction of firms to invest abroad (F_{ij}). If, on the other hand, productivity is constant, investment can increase only with an increase in the GDP (Y_j) or a fall in the fixed and variable costs in host country j.

Substituting for p_j and x_j,

$$FDI_{ij} = \left[\frac{\tau_{ij}^f c_j}{\rho P_j}\right]^{1-\sigma} Y_j N_i F_{ij} \tag{1.2}$$

12 Technically in this model, FDI should be measured by sales of foreign-owned subsidiaries, but because of the lack of detailed data, it is proxied by FDI stock. Affiliate sales and FDI stock are highly correlated. The correlation between total assets (that is, FDI stock plus liabilities) and sales of US majority-owned foreign subsidiaries across 113 countries in 2008 was 0.83. The correlation coefficient of the values of assets and sales, expressed in natural logarithm, is 0.97 (see Figure 2).

As shown in Appendix A,

$$F_{ij} = \frac{k a_L^{k-\sigma+1}}{(k-\sigma+1)({a_H}^k - {a_L}^k)} \left\{ \left[\frac{a_{ij}}{a_L} \right]^{k-\sigma+1} - 1 \right\} \tag{1.3}$$

The first component is common across all countries, but the second term in brackets reflects the country-specific fraction of firms that invests abroad.

Equation 1.2 can now be estimated empirically in its log-linear form in equation 1.4. The main host country (j) variables are as follows: GDP $(\ln Y_j)$, aggregated CES Price Index $(\ln P_j)$, and factor costs relevant for FDI $(\ln c_j)$. Factor costs capture per unit cost of production in country j such as wages, and all policy-related costs.

$$\begin{aligned} fdi_{ij} &= (\sigma-1)\ln\rho + (\sigma-1)\ln P_j + (1-\sigma)\ln c_j + (1-\sigma)\ln\tau_{ij} \\ &+ \ln N_i + \ln Y_j + \nu_{ij} \end{aligned} \tag{1.4}$$

The purpose of this paper is to examine how country-specific FDI-relevant policies and institutions affect the attraction of FDI in a single cross-section, so host countries are not assigned dummies. I approximate c_j by quantified FDI-specific regulations, GDP per capita, tariffs, and education levels. Variables with subscript i are captured by a fixed effect for the FDI source country.

Bilateral variables specific to country pairs such as distance, colonial tie, contiguity, and shared ethnic language can either hinder or facilitate bilateral transactions. Such costs have an observed component d_{ij} and an unobserved component e_{ij}.[13] An important additional regressor is w_{ij}. It captures the ij component of F_{ij}, the index for extensive margin. It is a monotonic function of the productivity cut-off, a_{ij}, and is correlated with d_{ij} because many of the same variables

13 Bilateral transaction costs $\tau_{ij}^{1-\sigma}$ are parametrized as $D_{ij}^{\gamma} e^{-u_{ij}}$; $u_{ij} \sim N(0, \sigma_u^2)$

that determine FDI flow determine the extensive margin. Although w_{ij} is unobserved, the cut-off condition in equation 1.1 implies that it can be estimated by the conditional probability of a positive investment flow from a probit (first-stage) estimation. Omission of w_{ij} would create a heterogeneity bias.

The second bias arises because of the correlation between e_{ij} and the included regressors in equation 1.4 as country pairs with zero investment flows are excluded from the sample. Only after controlling for these heterogeneity and sample selection biases can coefficients be rendered more accurate.

The discussion so far permits the specification of the benchmark regression (without correcting for biases) in equation 1.5. The dependent variable is the positive stock of bilateral FDI from country i to country j, averaged between 2007 and 2008.[14] Vector $\mathbf{X}$ consists of distance, and dummies for whether two countries share a border, an ethnic language, or have had a colonial relationship.

The benchmark regression also includes a dummy for whether the two countries have signed a Bilateral Investment Treaty (BIT) to assure reciprocal protection of foreign investment in each other's territory.[15] This variable later serves as a valid

14 UNCTAD defines FDI stock as the value of the share of capital and reserves (including retained profits) attributable to the parent enterprise (total assets minus total liabilities), plus the net indebtedness of the associate or subsidiary to the parent firm. FDI flows plummeted in 2008-09 because of the global financial crisis. I therefore disregard FDI values after 2008.

15 Most BITs contain broad commitments to protect investments by investors of one state ("the investor") in the territory of the other state ("the host state"), ranging from assurances of fair, equitable and non-discriminatory treatment to undertakings to observe investment contracts and other investment-related obligations. As Malik (2006) explains, these protections are accompanied by a powerful international arbitration mechanism that allows investors to bring claims directly against the host state alleging violations of these protections under international law. The ability of investors to enforce their rights directly against a state without the need of an agreement between the investor and state or the involvement of their own state is seen as one of the most far reaching innovations of BITs.

exclusion restriction in a two-step Heckman procedure to control for selection bias. The estimation equation is:

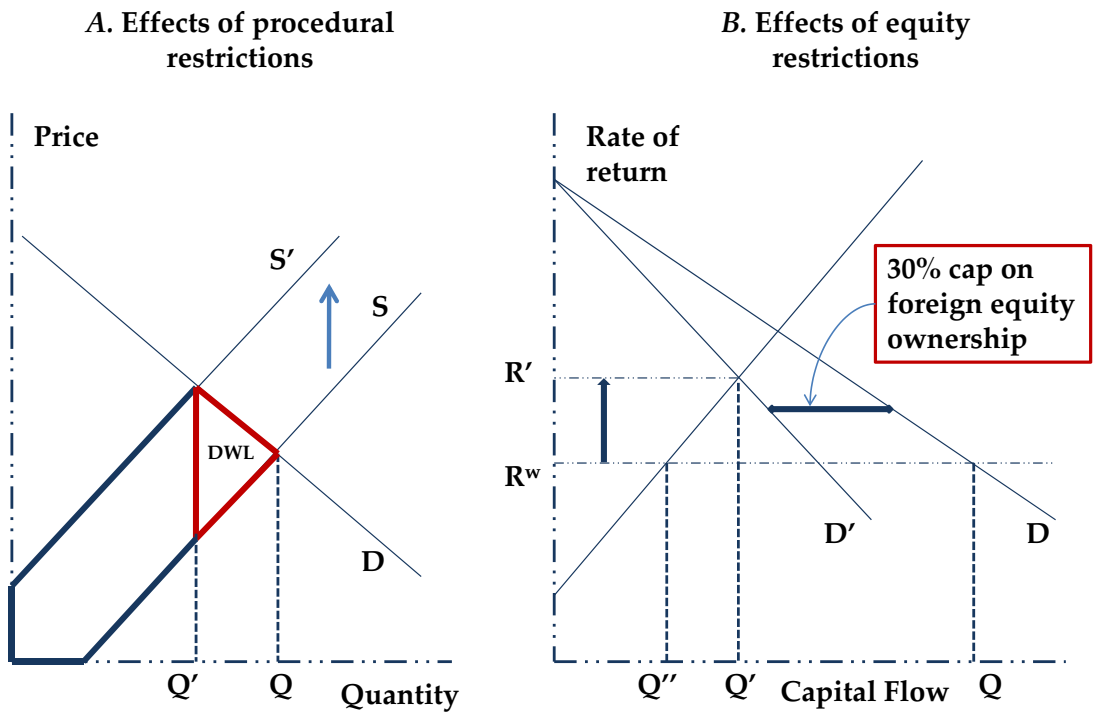
$$\begin{aligned}\mathbf{log(FDI_{ij})} &= \mathbf{X_{ij}a} + \mathbf{b_1 log(Openness)_j} + \mathbf{b_2 log(Arbitration)_j} + \mathbf{b_3 log(Procedures)_j} \\ &+ \mathbf{b_4(Quality\ of\ Institutions)_j} + \mathbf{b_5 log(GDP)_j} + \mathbf{b_6 log(GDP\ per\ capita)_j} \\ &+ \mathbf{b_7 log(Remoteness)_j} + \mathbf{b_8 log(Weighted\ Tariff)_j} + \mathbf{b_9 log(Schooling)_j} \\ &+ \sum_{\mathbf{i}} \mathbf{(Source\ Dummy)_i} * \mathbf{D_i} + \mathbf{e_{ij}} \qquad (1.5)\end{aligned}$$

The main explanatory variables in host country j are its openness to FDI, its start-up procedures for FDI, and its FDI-related arbitration regime. A simple theory on how they restrain FDI is illustrated in Figure 3. In Panel A, hurdles to start-up a subsidiary or resolve disputes act as cost-escalating measures that reduce the supply of the good or service (from Q to Q′) as they raise the real resource cost to providers at every price level. If the supply of foreign providers is choked off at Q′ (like a quota) there is a rent-creating effect in favor of incumbent firms.[16]

Panel B of Figure 3 shows another effect of restricting foreign capital from Holmes & Hardin (2000). If there is no restriction at the world rental rate (R^W) foreign capital meets the demand between Q′ and Q freely. With maximum ownership restriction of, say, 33 percent, every unit of foreign capital is matched by two units of domestic capital which needs a higher rate of return to be diverted into the sector. This leads to a derived demand (D') for domestic capital. The effect is that the rate of return is higher and less capital is used overall than in a state where there is no restriction on ownership of equity. The "tariff-equivalent" of the investment barrier is the difference between the return in the restricted sector and the return in the world market ($R' - R^W$).

16 Dee (2003) explains this in terms of liberalization leading to a "triangle gain" from allocative efficiency as the tax-equivalence posed by restrictions to entry are removed, and a "rectangle gain" from productivity enhancement when the high cost of starting or running a business is reduced in a manner that saves real resources to be used elsewhere.

Figure 3: Illustration of the Impact of Restricting FDI



Source: Holmes & Hardin (2000)

I posit that the three indicators of openness, procedures and arbitration capture a defining thought process of a typical foreign investor. *First*, the investor is concerned about whether the host country permits foreigners to set up a business in a specific sector; if it does, how much equity can foreigners own? *Second*, if entry is permitted, what additional hurdles (legal and bureaucratic) does the country pose through regulations and how costly are they? *Third*, after the operation commences, and if commercial disputes arise, can they be resolved with enforceable outcomes in a reliable manner? The first issue is about FDI-specific openness; the second and third issues represent the quality of FDI-specific institutions.

FDI Openness is measured by computing the average of the percentage of equity that foreign investors can own in firms across 11 sectors (more in the next

section). FDI Procedures measure the number of legal steps required before and after incorporation to start a wholly foreign-owned business. I construct the FDI Arbitration index by averaging indicators measuring i) the Ease of Arbitration Process and ii) the Extent of Judicial Assistance in resolving commercial disputes from the IAB data set. The Ease of Arbitration Process assesses whether there are restrictions on what the conflicting parties can or cannot do to resolve their dispute. The Extent of Judicial Assistance measures the role of domestic courts in assisting the process of arbitration and enforcing awards.

To control for the *general* quality of institutions, I compute a composite indicator of five WGI developed by Kaufmann et al. (2010) with weights derived from Principal Components Analysis (PCA). The WGI variables are: i) the rule of law; ii) control of corruption; iii) regulatory quality; iv) political stability; and v) governmental effectiveness. Of the six WGI indicators, the one that I exclude is "voice and accountability" which is argued to capture citizens' participation in selecting their government, as well as freedom of expression, freedom of association, and free media. I find this to be a less relevant determinant of FDI.[17]

The control for a general quality of institutions as measured by the WGI variables is important because I want to see whether FDI-specific regulations matter for FDI *over* and *beyond* the general quality of institutions. In other words, after controlling for the general quality of institutions, do FDI-specific provisions add any value?

Market size of the host country, proxied by GDP, is one of the most important determinants of horizontal FDI. Motives for vertical FDI are captured by GDP per capita (which proxies for average wage and the quality of infrastructure). Tariff

17 I concur with Thomas (2006) who argues that the concept of voice first articulated by Hirschman (1970) is not synonymous with accountability, freedom to select government, or other political freedoms. Nor is there a well-documented relationship between them. Overall, in terms of coverage of countries and topics, the WGI indicators are perhaps the most authoritative and widely used to assess the quality of institutions across countries over time. They are imperfect because they are a quantitative aggregation of perceptions (subjective data). For a summary of criticisms of these indicators and the response from the authors, see Kaufmann et al. (2007).

rates are measured by the weighted average of applied tariffs on manufactured imports. The effect of high tariffs on FDI, a priori, is ambiguous: it may encourage tariff-jumping horizontal FDI, but discourage vertical FDI that relies on repeated flows of parts and components across borders. The general skill level in the country is assessed by the average number of years of schooling undertaken by adults aged 25 and over. Other determinants of FDI that are not included as regressors are subsumed under the unobserved term, e. The description, source, and summary statistics of the variables are in Tables 13 and 14.

1.4 DATA

I average outward FDI position (stock) in US dollars for 2007 and 2008 from 30 OECD countries into 87 OECD and non-OECD countries belonging to the IAB sample (Table 16). The years 2007 and 2008 represent the latest and most stable number of observations in the OECD's FDI database, prior to the plunge in cross-border flows in 2009 because of the global financial crisis. Two-year averages are used to smooth out annual fluctuations. For robustness, I also use un-averaged annual data for 2006, 2007, and 2008. Bilateral FDI from each source country, instead of aggregate FDI from all source countries, is used to cast the relationship in a gravity framework yielding a richer set of observations than would be the case for a cross-country regression with aggregate FDI. Source countries include only members of the OECD because of data constraints; however, they have historically accounted for the majority of global FDI outflows.[18]

The choice of FDI stock as the dependent variable, preferred to FDI flows, needs elaboration. The model in Melitz (2003) which inspired Helpman et al. (2008) is inherently cross-section because it assumes steady state productivity levels for

18 FDI outflows from non-OECD countries are increasing. For example, in 2003, 12.3 percent of total FDI inflow into the 10 member countries of the Association of Southeast Asian Nations (ASEAN) was from China, India and other ASEAN countries; by 2008, the corresponding share had reached 24.8 percent (ASEAN 2010).

each year, and does not predict how firm productivity changes year to year. Because I do not have a variable time dimension in my econometric model, the effects of explanatory regressors are on an equilibrium level of FDI. This is better reflected by FDI stock because it is far less volatile on an annual basis than FDI flows. Importantly, the extensive margin of FDI measured by whether multinational firms from country i operate in country j can only be estimated by FDI stock, not flows.

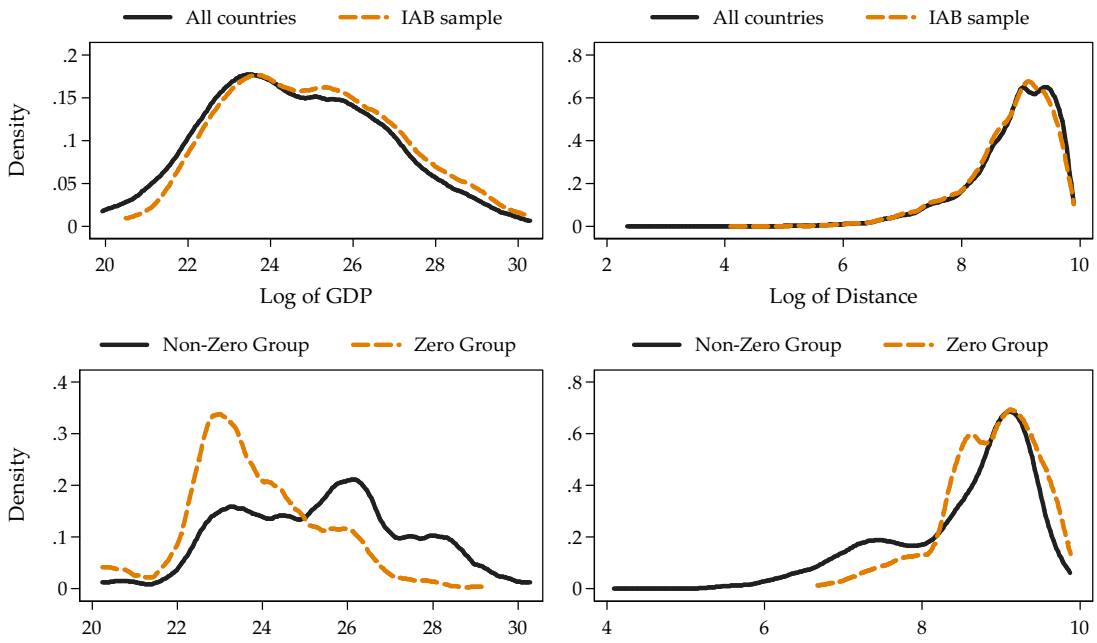
For the main explanatory variables, I use the new IAB indicators of FDI regulation across 87 economies, prepared by the World Bank Group in 2010. With 21 countries from Sub-Saharan Africa, 20 from Eastern Europe and Central Asia, 14 from Latin America and Caribbean, 10 from East Asia and Pacific, five from South Asia, and five from the Middle East and North Africa, this sample of 87 countries can be considered random, and a fair representation of the actual world. In 2007-08, they constituted 87.1 percent of global population and 77.9 percent of global output (Table 15). The sample includes 15 high-income OECD countries.

As shown in Figure 4, in terms of market size, the mean and standard deviation of the sample of all countries[19] in the world and the subsample of 87 IAB countries are almost identical. However, within the IAB sample the distribution of the subgroup with zero FDI observations is remarkably different from the subgroup with non-zero observations. The sample selection bias is, therefore, likely to be more prominent within the IAB sample.

The 23 IAB indicators measure, among others, openness to FDI through equity ownership permitted in 11 sectors (11 indicators); time, procedures and regulations for starting a foreign business (three indicators); arbitrating commercial disputes (three indicators); and accessing industrial land (6 indicators). The data are compiled from detailed surveys filled out by over 2350 local experts from leading law and accounting firms, chambers of commerce, and investment promotion

19 Excludes countries with total population of less than one million in 2008.

Figure 4: Randomness of Country Samples



Source: WDI & CEPII

agencies. Collected during the period 2006-08, these indicators reflect regulations that prevailed before 2006 in each of the 87 countries.

In terms of the coverage of subjects, sectors, and countries, this data set on FDI regulations is the most comprehensive to date. It comprises both de jure indicators measuring laws and regulations on paper, and de facto indicators that measure the implementation of those laws. To the extent possible, I create sub-indices of primarily de facto indicators of FDI Arbitration and FDI Procedures to use in the empirical estimation. On FDI Openness, the indicators are only de jure, and these tend to do less justice to countries that are open to foreign investment in practice but have not enshrined it in written law. I expand on the main explanatory variables below.

1.4.1 *Investing Across Sectors*

Restriction on equity ownership across sectors is one of the most important indicators of a country's policy attitude towards foreign investment. The index of FDI openness is created for 86 countries[20] by averaging the equity ownership permitted for foreign companies across 33 subsectors. These measure statutory (not de facto) restrictions to the ownership of equity by foreigners in new (greenfield) investment, and investment in existing firms through mergers and acquisitions. Sixty-six data points for each country are aggregated first into 33 subsectors, and then into 11 industries (eight of which are services, two are resources/primary, and one manufacturing). The final index shows on a scale of 0 to 100 the overall openness in a given country to ownership of firms by foreign investors (0 being least open).

20 Excluding Papua New Guinea for which equity data could not be confirmed.

1.4.2 *Arbitrating Commercial Disputes*

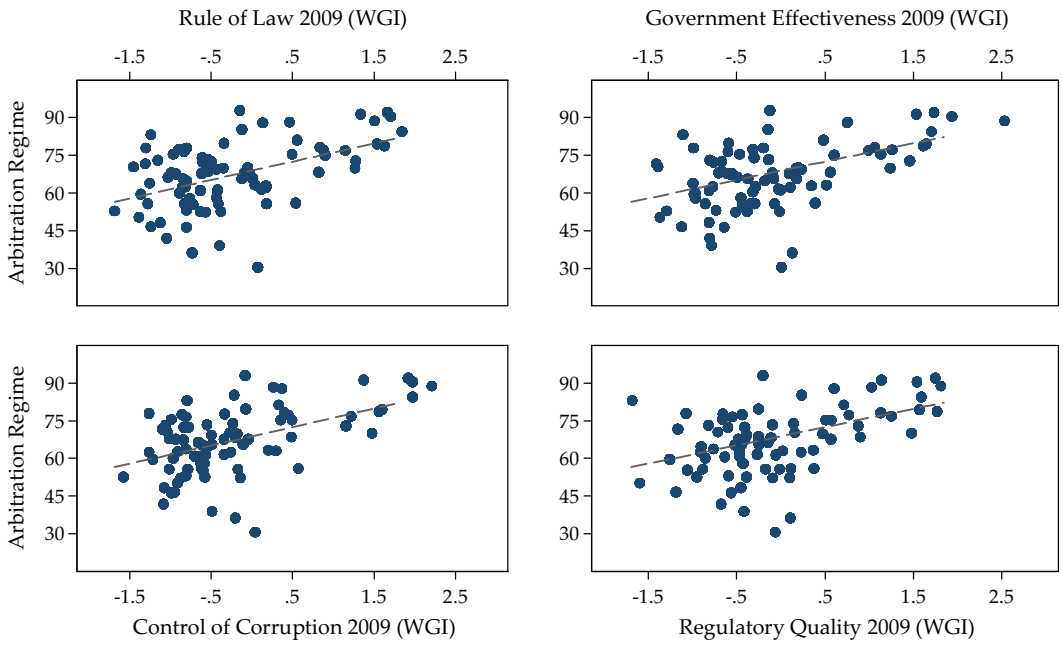
Most foreign companies prefer resolving disputes through arbitration over lengthy litigation in local courts. The indicators assess the strength of legal frameworks for alternative dispute resolution by combining the Ease of Arbitration Process and the Extent of Judicial Assistance indices to represent the quality of FDI-specific institutions. This index directly deals with how foreign investors prefer to resolve contractual or commercial disputes. It is also strongly correlated with the rule of law, government effectiveness, corruption, and regulatory quality pillars of the World Governance Indicators that summarize a country's institutional regime in general (Figure 5).[21]

Specifically, the index on the Ease of Arbitration Process scores, among others, best practice provisions for party autonomy and tribunal integrity. Autonomy assesses whether the laws allow parties to choose arbitrators or arbitral institutions, the language of proceedings, and whether foreign counsels can represent investors. Tribunal integrity measures whether there exist provisions to ensure that arbitrators remain independent and impartial and whether the proceedings remain confidential. The other index on judicial assistance evaluates whether local courts follow a "pro-arbitration" policy, whether tribunals decide the jurisdiction of disputes and whether the courts assist tribunals by requiring the appearance of witnesses and production of evidence.

What are the bases for these indicators? Investors need to be assured that their investments will not be unjustly expropriated and that in instances of disputes, there is a predictable course for resolution. An effective arbitration regime for FDI mitigates risk by providing legal security to investors (including assurance

21 The scatter plots in Figure 5 exclude outliers – Afghanistan and the Solomon Islands – that score zero on the Ease of Arbitration Process index and the Extent of Judicial Assistance index. Serbia is excluded from the WGI data set. This leaves 84 country observations.

Figure 5: Quality of Institutions and Arbitration Regimes



Source: WGI & IAB

of contract enforcement rights, due process, and access to justice). It gives parties autonomy to create systems tailored to their disputes. According to World Bank Group (2010), countries that score well on these indicators have a strong arbitration legal framework, receive support from local courts for arbitration proceedings and efficient enforcement, adhere to international conventions, and provide autonomy to parties seeking to resolve their commercial disputes.

1.4.3 *Starting a Foreign Business*

Starting a Foreign Business indicators record the time, procedures, and regulations involved in establishing a local subsidiary of a foreign limited liability company. Here, I use the number of procedures required to establish a foreign business. This resembles a cost that affects the decision about whether and how much a firm invests in a foreign country. The steps include both pre- and post-incorporation procedures with which foreign businesses are officially required to comply. According to World Bank Group (2010), countries that score well on the Starting a Foreign Business indicators have simple and transparent establishment processes that abolish unnecessary steps (which create opportunities for rent-seeking). High scorers also treat foreign and domestic investors equally, and differences in treatment vary only by company size, legal form or commercial activity, not the nationality of shareholders. Tables 19 to 21 describe how indicators of FDI-specific regulations are constructed in the IAB data set. I separately construct composite country scores for the quality of selected FDI regulations in Table 22.[22]

22 The Investing Across Sectors score (1) averages the maximum percentage of equity permitted for foreign ownership in the 11 sectors mentioned in Table 19. The Ease of Process Index (2) and the Ease of Judicial Assistance Index (3) are obtained by normalizing the country score for those indices using the min-max rule: the score for a country is subtracted from the best-performing country, divided by the difference in scores between the best and worst-performing countries. The number is then multiplied by 100. Higher the score, better is the regime in place for resolving commercial disputes. The score for the Number of Procedures (4) is also obtained by normalizing the country score using the min-max rule. However, the final score is multiplied by, and subtracted from, 100. Higher the score, the fewer the number of pre- and post-incorporation procedural steps formally required to establish a wholly foreign-owned subsidiary.

1.4.4 *Bilateral Investment Treaty*

Data on bilateral investment treaties between 30 OECD source countries and 87 IAB host countries are collected from UNCTAD's Investment Instruments Online.[23] Bilateral Investment Treaties (BITs) are agreements between countries for the reciprocal encouragement, promotion and protection of investments in their territories. Like preferential trade agreements, BITs, too, have proliferated dramatically in recent decades from around 400 in 1990 to over 2,500 at present.

1.4.5 *Gravity and Other Variables*

The gravity variables – distance, past colonial relationship, contiguity and shared languages – are obtained from CEPII (2010). Economic variables – GDP, GDP per capita, average (weighted) applied tariff on manufactured imports – are from the World Development Indicators (WDI) database (World Bank 2011). Mean years of schooling are from Barro & Lee (2010), as intrapolated in UNDP (2010). These explanatory variables available annually are averaged over the preceding five years, that is, 2002 to 2006 to minimize the possibility of simultaneity. I compute the remoteness index as the sum of all bilateral distances between a country and all its partners, weighted by the share of the partner's GDP in total world output.

With 30 source countries and 87 host countries, there are 2610 potential observations. Gravity-related information is not available for three host countries (Kosovo, Montenegro and Serbia). Because 15 OECD countries also appear in the IAB sample of FDI recipients, another 15 observations are lost, reducing the number of observations to 2505. If FDI stock data are missing for the years 2007-08, but they were reported for the period 2002-06, I recode the missing data points as zero.

23 See UNCTAD (2010).

This affects 82 country pairs; 641 data points are deemed missing and dropped along with 29 negative values for FDI stock (divestitures).

Of the remaining 1835 observations, there are 724 observations that are confirmed to be zeros.[24] Not all of the 87 countries in the IAB sample have values for all explanatory variables. Papua New Guinea has no data on FDI Openness; Sierra Leone, Haiti and Liberia do not have data on tariffs. Further, four OECD source countries (Italy, Spain, Japan and Switzerland) do not have zero FDI in any of the remaining IAB countries (after missing values are dropped). This poses a problem for the two-step econometric methodology employed in this paper; those source countries are therefore dropped. Belgium and Mexico do not report any data for FDI stock for the years under consideration. All these reduce the number of observations used in the estimation of the main regressions to 1578 bilateral FDI stock values between 24 OECD source countries and 80 IAB host countries, including 666 observations of confirmed bilateral flows with the value of zero.

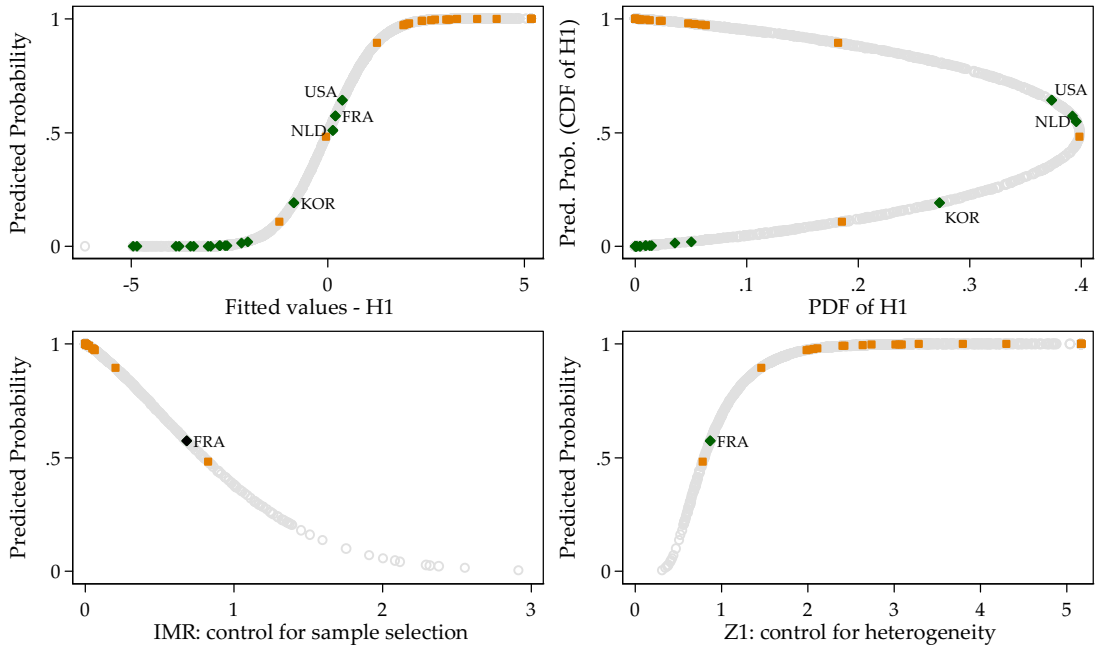
1.5 ESTIMATION METHOD

The estimation method proceeds in five stages. *First*, I estimate the log-linearized gravity equation 1.5 using the Ordinary Least Squares (OLS) method, without correcting for biases. *Second*, I correct for the selection bias in two steps. First, a probit model predicts the probability, $\hat{p}_{ij}$, of countries having a positive FDI relationship conditional on explanatory variables that are used to estimate equation 1.5. I use the binary BIT variable as a valid exclusion restriction. This permits the computation of the inverse Mills ratio $(\widehat{\overline{\eta}}_{ij})$ for inclusion as an additional regressor in the second step to control for sample selection.

In Figure 6, the top-left graph shows predicted probability of OECD countries i investing in country j on the y-axis. The x-axis plots the normalized fitted values

24 As already explained, one positive aspect of OECD's bilateral FDI statistics is that they clearly distinguish between values that are missing and values that are confirmed to be zeros. In trade statistics, this is often not done, leading researchers to erroneously treat unreported (missing) data as zero.

Figure 6: Correcting for Country and Firm Selection Biases



Source: Regressions by author using data from OECD (2011)
Note 1: Diamond-shaped dots are FDI to Mali and squared dots are FDI to Spain
Note 2: Other (gray) dots represent other country pairs

of the latent variable that affects FDI participation. The top right graph plots the cumulative distribution function (CDF) of the unit normal (predicted probability) on the y-axis against the PDF of the fitted value of the latent variable on the x-axis. The ratio (PDF/CDF) obtained is the inverse Mills ratio ($\widehat{\overline{\eta}}$), as depicted on the x-axis of the bottom-left graph. The inverse Mills ratio controls for the fact that there are countries in the sample with low predicted probability (and large errors).

Selection bias occurs in two ways: i) when only countries with "high" values of observed variables are included in a non-random sample; and ii) when countries with "low" values of observed explanatory variables are also in the sample with large, unobserved error terms. It is (ii) that is a more serious problem because the correlation between the error terms and the observed variables biases the coefficients. For example, the Sub-Saharan economy, Mali, in 2007-08 had an FDI relationship only with France (among OECD members). Conditional on observed explanatory variables, the predicted probability of a positive FDI relationship be-

tween Mali and France is 0.57. If France had not been a former colonial power, the predicted probability would have been 0.36. The second scenario would then have led to a higher inverse Mills ratio.[25]

Third, I take into account firm heterogeneity by incorporating controls derived from predicted probabilities which are first normalized, $\hat{z}_{ij} = \Phi^{-1}(\hat{p}_{ij})$. Because the latent variable that determines whether or not two countries have an FDI relationship is linked to the productivity level of the marginal firm, it can be used to control for the unobserved heterogeneity term in equation 1.4. If firm productivity is Pareto-distributed, this has the form $max\left\{Z_{ij}^{\delta} - 1, 0\right\}$ where $\delta = \frac{k-\sigma+1}{\sigma-1}$. The latent variable is unobserved, but its log value is estimated by the inverse of the unit normal of predicted probabilities, $\hat{z}_{ij} = \Phi^{-1}(\hat{p}_{ij})$. Given that $E\left[z_{ij}|FDI_{ij} = 1\right] = E\left[z_{ij}\right] + E\left[\eta_{ij}|FDI_{ij} = 1\right]$, Helpman et al. (2008) show that control for unobserved firm heterogeneity can be estimated by $\hat{\bar{z}}_{ij} = \hat{z}_{ij} + \hat{\bar{\eta}}_{ij}$. In other words, the index $\hat{\bar{z}}_{ij}$, shown on the bottom right graph of Figure 6 as Z1, controls for the effect of investment restrictions on the proportion of firms able to profitably invest abroad. If the host (and bilateral) country characteristics pose low barriers (c_j, τ_{ij}, f_{ij}) and there is high demand in (Y_j), for a given level of productivity (a_{ij}) a greater fraction of firms will find it profitable to invest.

Fourth, the final regression is estimated both by Non-linear Least Squares (NLS) and OLS. The former is a parametric estimation that requires firm productivity to be Pareto-distributed. Helpman et al. (2008) suggest that estimates can also be obtained from OLS if the extensive margin is represented by a polynomial of $\hat{\bar{z}}_{ij}$.[26] Because the OLS coefficients have the same sign and are very close in magnitude to the NLS estimates, I opt for the simpler OLS method to report most of the robustness results in subsequent sections.

25 Note that probit also predicts a moderately high probability of two other source countries – United States (US) and Netherlands – having a direct investment relationship with Mali even though in reality they do not invest there. This is because the two countries have invested in similar-sized African economies: the Netherlands in Burkina Faso and Rwanda, and the US in Rwanda. The Netherlands also has a BIT signed with Burkina Faso and the US has one with Rwanda.

26 Note that $\hat{\bar{\eta}} = \frac{\phi(\hat{z}_{ij})}{\Phi(\hat{z}_{ij})}$; $\hat{z}_{ij} = \Phi^{-1}(\hat{p}_{ij})$; and $\hat{\bar{z}}_{ij} = \hat{z}_{ij} + \hat{\bar{\eta}}_{ij}$

Fifth, the two biases that are corrected in the preceding step are disentangled to assess the relative dominance of each. The purpose is to find whether the failure to control for firm heterogeneity biases the coefficients more than the failure to control for sample selection bias arising from zero investment flows between numerous country pairs.

All the inferences are based on standard errors that are robust and clustered by host country under the assumption that FDI from OECD countries flowing to a common host country is influenced by the latter's characteristics that apply in common to all source countries, in addition to pair-specific characteristics. If a shock in a host country affects potential investment from all source countries, then FDI inflows are correlated. As Moulton (1990) shows, if errors within groups are correlated, but incorrectly assumed to be independent, standard errors are likely to be substantially biased downward leading to findings of statistical significance that are spurious. In this paper, clustering of standard errors by host country yields the most conservative set of inferences on the significance of coefficients, and is the chosen approach in all the regressions.[27]

1.6 RESULTS

Columns 3 and 4 in Table 1 report the main results, obtained from NLS and OLS models, respectively. When both the biases introduced by country selection and firm selection are corrected, FDI-specific institutions significantly affect the accumulation of foreign direct investment.

The coefficient of FDI Arbitration – a variable with a close relationship with a judicial regime and enforcement – is significant at the 5 percent level, whereas it was not statistically different from zero in the benchmark estimation that does not

27 I also cluster standard errors by *source* country (to account for agglomeration tendencies) and by country pairs. Clustering by *source* country makes several coefficients appear much more significant than when clustering is by host country. Note that the magnitudes of coefficients do not change irrespective of how the standard errors are clustered.

correct for biases (column 2). An improvement of ten percent in the standardized score for FDI Arbitration (say, from 70 to 77) increases the stock of FDI by at least 4 percent.

The coefficient on FDI Procedures is significant in the (biased) OLS estimate of column 2, but its magnitude increases in the bias-corrected estimates of columns 3 and 4. Both FDI Procedures and FDI Arbitration coefficients are highly significant after controlling for the general quality of institutions in the country. The coefficient on institutional quality is not positively significant either when it is proxied by the composite WGI indicator or when it is replaced by each of the five separate constituents of WGI in Tables 4 through 8.

Previous studies (for example, Daude & Stein 2007) found a strong association between good institutions and high FDI inflow. My results suggest that FDI-specific provisions in practice offer direct incentives for FDI in a manner over and above what is offered by good institutions in general. FDI is responsive to specific instruments such as an effective arbitration regime and less onerous business start-up procedures. In the presence of sound FDI-specific provisions, the generally high quality of institutions and governance appears to add no additional attraction to FDI. From a policy maker's perspective, this is not bad news. A minister keen on attracting FDI into her country need not be despondent that it would take decades to overhaul the rule of law or reduce high levels of corruption; she can start with piecemeal reforms in regulation and enforcement that are of direct concern to investors.

The coefficient of FDI Openness, however, is not significant in any of the regressions. This implies that openness to FDI "on paper" is not meaningful. While FDI Procedures and FDI Arbitration indices mainly consist of de facto indicators that assess the implementation of laws and not just the written text, the FDI Openness index comprises solely of de jure indicators. High FDI-receiving countries like Brazil, Russia, India, and China (BRIC), for example, have lower openness scores

Table 1: Main Regressions: FDI Stock in 2007-2008

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	Benchmark	Heterogeneity		Bias I	Bias II
			NLS	OLS		
FDI Procedures	-.060	.458**	.514**	.501**	.515**	.457**
	(.095)	(.197)	(.200)	(.202)	(.199)	(.203)
FDI Arbitration	-.159**	.260	.411**	.409**	.362*	.300
	(.064)	(.206)	(.200)	(.197)	(.195)	(.206)
FDI Openness	-.113	.054	.141	.127	.119	.061
	(.107)	(.128)	(.126)	(.130)	(.124)	(.126)
Quality of Institutions	.390**	-.111	-.316	-.330	-.337	-.132
	(.153)	(.203)	(.207)	(.208)	(.212)	(.207)
GDP	.624***	.857***	.468***	.496***	.492***	.842***
	(.067)	(.083)	(.124)	(.134)	(.124)	(.092)
GDP Per Capita	-.189*	.036	.150	.141	.143	.008
	(.109)	(.184)	(.190)	(.185)	(.187)	(.180)
Weighted Tariff	-.255*	-.390**	-.026	-.221	-.232	-.387*
	(.137)	(.196)	(.020)	(.206)	(.203)	(.196)
School (Mean Years)	.575***	.295	-.146	-.083	-.081	.323
	(.175)	(.305)	(.328)	(.331)	(.324)	(.302)
Remoteness	2.814***	2.822***	1.251*	1.466*	1.417*	2.787***
	(.459)	(.669)	(.682)	(.798)	(.718)	(.692)
Distance	-1.578***	-1.382***	-.466*	-.550**	-.534**	-1.364***
	(.168)	(.147)	(.236)	(.264)	(.225)	(.155)
Contiguity	.347	1.083**	1.030**	1.066**	1.053**	1.080**
	(.615)	(.454)	(.437)	(.427)	(.430)	(.448)
Colony	.632*	.938***	.544*	.605*	.578*	.937***
	(.363)	(.311)	(.291)	(.310)	(.296)	(.306)
Investment Treaty	.392***	.267				
	(.140)	(.179)				
δ from $\left(\hat{\bar{\omega}}_{ij}^{*}\right)$			.682***			
			(.201)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			.177	.003		-.179
			(.358)	(.600)		(.378)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$				1.175***		
				(.405)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$					.663***	
					(.148)	
No.	1578	912		912	912	912
Adj. R-sq.		.66	.68	.67	.67	.66

Note 1: robust standard errors (clustered by host country) reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

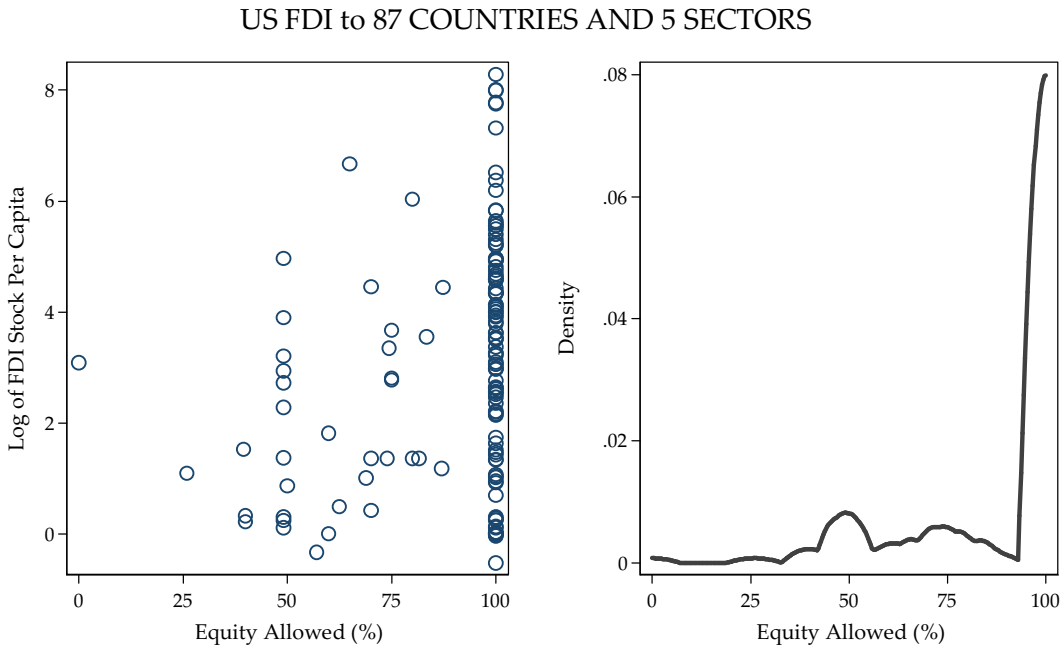
Table 2: Regressions: OECD Source Countries Excluded

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.049	.326**	.312*	.334**	.300*
	(.096)	(.156)	(.158)	(.158)	(.156)
FDI Arbitration	-.150**	.246	.379**	.327*	.286
	(.065)	(.196)	(.190)	(.184)	(.192)
FDI Openness	-.092	.072	.117	.106	.082
	(.116)	(.125)	(.132)	(.126)	(.126)
Quality of Institutions	.274	-.130	-.233	-.238	-.078
	(.171)	(.243)	(.257)	(.256)	(.238)
GDP	.668***	.939***	.669***	.659***	.974***
	(.067)	(.082)	(.162)	(.149)	(.088)
GDP Per Capita	-.207*	.140	.210	.210	.105
	(.117)	(.186)	(.192)	(.195)	(.182)
Distance	-1.832***	-1.945***	-1.283**	-1.222***	-2.026***
	(.203)	(.190)	(.503)	(.424)	(.190)
Remoteness	3.823***	4.657***	3.309**	3.153***	4.702***
	(.565)	(.723)	(1.302)	(1.177)	(.756)
Weighted Tariff	-.296**	-.489**	-.363	-.368	-.489**
	(.150)	(.229)	(.225)	(.225)	(.224)
School (Mean Years)	.598***	.108	-.164	-.141	.170
	(.187)	(.327)	(.394)	(.390)	(.332)
Contiguity	.217	2.297***	2.122**	2.143***	2.323***
	(.609)	(.775)	(.819)	(.789)	(.787)
Colony	.494	1.246***	1.029***	1.018***	1.258***
	(.386)	(.289)	(.339)	(.332)	(.301)
Language	.468**	.445	.228	.227	.415
	(.234)	(.279)	(.324)	(.313)	(.283)
Bilateral Investment Treaty	.489***	.296			
	(.151)	(.219)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}^{*}_{ij}\right)$			.306		.160
			(.693)		(.430)
Z1 $\left(\hat{\bar{z}}^{*}_{ij}\right)$			1.204**		
			(.511)		
Z1*Z1			-.116		
			(.094)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.448*	
				(.238)	
No.	1220	622	622	622	622
Adj. R-sq.		.62	.63	.63	.62

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Figure 7: FDI and Statutory Openness



Source: IAB and US Bureau of Economic Analysis (www.bea.gov)
Note 1: 87 countries, 5 sectors; 133+ values (out of 435)

than countries like Afghanistan and Haiti which receive insignificant amounts of FDI. Obviously BRIC offers conspicuous advantages like market size to investors that small, conflict-ridden economies do not. That, on paper, the poorer countries allow 100 percent ownership of equity should foreigners invest does not seem to matter when most other determinants of FDI are accounted for. This is illustrated in Figure 7 with outward *sectoral* FDI data from the United States to 87 IAB countries.[28] There is no systematic relationship between countries' openness score and actual FDI received by sector.

In the bias-corrected models of column 3 and 4 in Table 1, the elasticity of FDI with respect to distance drops dramatically, by two-third, from that in the (biased) benchmark model in column 2. The positive effect of a shared border increases, but the coefficient of common colony falls modestly in the bias-corrected models. Coefficients on remoteness and GDP are also subdued in the bias-corrected models. The coefficient of GDP per capita is not statistically significant in any of the regressions. Coefficients on the average education level of the adult population and the mean level of weighted tariff on manufactured import in host countries are also not statistically different from zero. I detail the estimation procedure and results in the rest of this section.

In Table 2, FDI-receiving OECD countries in the sample are dropped so that the FDI relationship is now between the 24 OECD source countries and 65 non-OECD host countries. Coefficients on FDI Arbitration and FDI Procedures are both statistically significant although the magnitudes are lower than in the fuller sample (Table 1). The elasticity of distance in the biased regression is much higher than in the main regression, which drops by about one-third when biases are corrected. This indicates that the inclusion of 15 OECD countries in the sample overestimated the effect of FDI-specific provisions and underestimated the hurdle posed by bilateral distance. When the proportion of developing countries in the sample grows,

28 The 5 sectors are mining, manufacturing, banking, insurance and telecommunications. Concordance between the sectors defined by the US Bureau of Economic Analysis and IAB is not exact. FDI stock figures from the US are averaged between 2007 and 2008.

the elasticity of distance increases, indicating that among less developed countries, traditional barriers remain important.

Column 1 of Tables 1 and 2 show probit estimates of the marginal effects of variables that affect the probability that two countries would have an FDI relationship. OECD countries are more likely to invest in countries whose market size is big, are closer in terms of bilateral distance, and with which they share a colonial and linguistic heritage. They are less likely to go to a country with high trade protection. Curiously, the propensity to invest in countries with good FDI-specific institutions is low after controlling for the quality of institutions and other country-specific characteristics. The coefficients on the implicit start-up cost for foreign businesses (measured by the number of legal procedures) and openness to FDI are not significant.

Importantly, in the probit model (column 1 in Tables 1 and 2), the coefficient of BIT is significant at the 1 percent level indicating a strong propensity for OECD countries to invest in host countries that assure protection against expropriation and provide other guarantees for foreign investors. Column 2 reports OLS estimates of an augmented gravity-type model with the same variables used in the probit regression, but without any correction for biases. The coefficient on the BIT variable is not significant, suggesting that it does not affect the volume of FDI after the decision to locate in a country has been made. In other words, it affects the propensity to invest (driven by fixed cost) but not the volume of investment (driven by variable cost). The BIT variable is, therefore, a valid exclusion restriction that is vital for identification in models aimed at correcting truncation biases.

The coefficient of FDI Procedures in the (biased) benchmark regression of column 2 is highly significant. As in the probit estimates, coefficients for GDP, tariff, distance, colonial history and contiguity are of the same sign and similar magnitude. One major difference between the probit and the biased OLS coefficients is that the coefficient for the quality of institutions is not significant. Remoteness

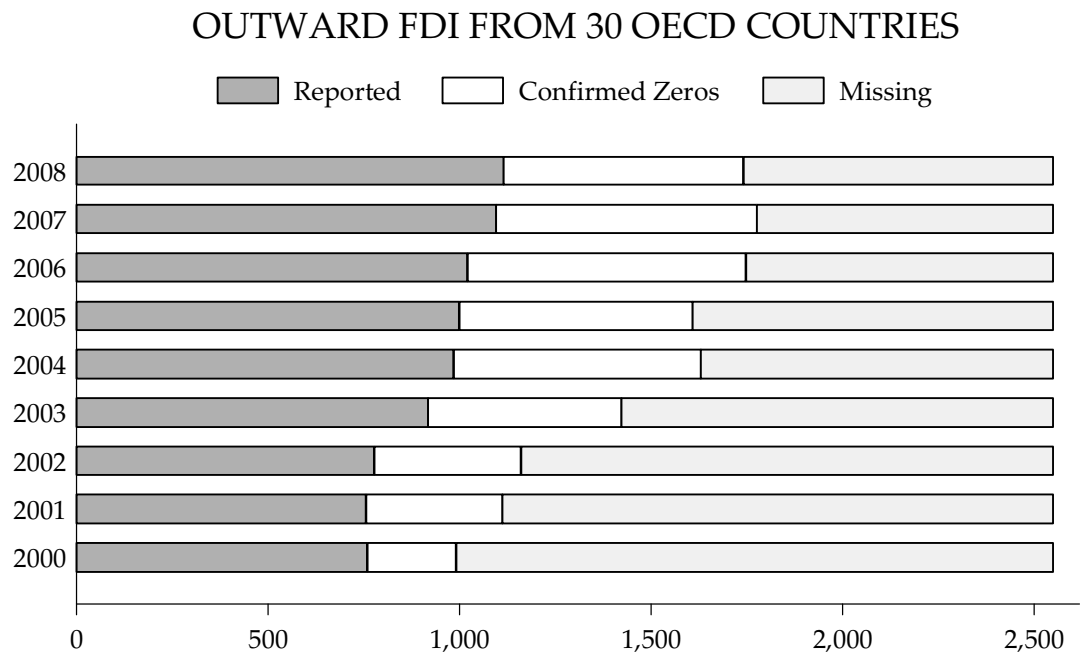
appears to be highly significant and positive, indicating that the relatively distant countries in the sample like the Solomon Islands, Chile, Argentina, Brazil, and Southern African countries are attractive destinations for FDI. This could be because these countries attract resource-based FDI (which is location-specific), or because remote country pairs invest much more in each other than an equi-distant pair elsewhere that is less remote.

As mentioned earlier, a major problem with log-linearized OLS regression (column 2) is that the sample only includes countries that have an active FDI relationship, and drops all country pairs between which the FDI flow on average between 2007 and 2008 is zero. Over 42 percent of the remaining sample drops out in this manner, which represents not only a mammoth loss of information, as shown in Figure 8, but also points to a potential cause of selection bias. After this, the dependent variable is not really bilateral FDI, but bilateral investment contingent on a relationship existing. A crucial variable left out of the model is the probability of being included in the sample, that is, having a non-zero FDI flow. If countries with active FDI relationships are not randomly selected from the population, and the probability of selection is correlated with independent variables like distance, then the gravity coefficients are no longer reliable.

1.6.1 *Country Selection Bias*

Column 5 in Table 1 reports results after correcting for selection bias using the standard Heckman procedure. In the first stage, the probit estimates in column 1 give the probability of an FDI relationship existing conditional on the same explanatory variables used to estimate the benchmark equation. An inverse Mills ratio is computed from the conditional probabilities and then included as a regressor in the second stage, which excludes the identifying variable (BIT). The magnitudes of a number of coefficients change modestly between the (biased) benchmark regression and the selection corrected model, but the overall sign and significance

Figure 8: Reported and Unreported FDI Data



Source: OECD (2011)
Note 1: 85 IAB host countries, excluding Kosovo and Montenegro

are retained. The inverse Mills ratio is also not statistically significant, indicating that the bias arising from country selection is not a serious problem in the case of bilateral FDI. This means that even if countries with zero FDI flows excluded from the country sample in the benchmark regression are now included, the benchmark elasticities of the impact of barriers would not change much.

This result, however, does not undermine the case for the correction of potential selection bias. Indeed, the common practice in the extant gravity literature of making an ad hoc correction to zero flows by recoding zeros as unity, and then including the logged value of unity (zero) in the sample is flawed. This is seen in Table 3. The first column reports estimates when the zeros are simply dropped. Columns 2-4 correct for sample selection following three similar approaches: column 2 estimates the full model with maximum likelihood; column 3 reports results from the Heckman two-step model (with probit selection equation estimated with maximum likelihood, and the outcome equation by OLS); column 4 repeats the procedure of column 3 manually. The coefficients are identical, but this approach yields more conservative standard errors.[29] All three approaches confirm that the coefficients of the biased benchmark model do not alter much in the version with correction for sample selection. (The coefficient on the FDI Arbitration variable is, however, significant at the 10 percent level in two of the three models that correct the sample selection bias).

Now, compare the selection corrected estimates of columns 2-4 with those from an ad hoc adjustment in column 5. Coefficients on the FDI-related policy variables, the quality of government and schooling are completely different. Coefficients on the gravity variables, however, are similar in magnitude. Although the

29 The two-step approach is more popular and is the one used by Helpman et al. (2008). Verbeek (2004) argues that a full maximum likelihood estimation of the sample selection model is more efficient than the two-step procedure. Further, the OLS regression provides incorrect standard errors because the remaining residual is heteroskedastic and the inverse Mills ratios (lambdas) are not directly observed but estimated from the first stage regression. The two-step method will also not work if the lambdas do not vary much across observations. Verbeek argues that the full maximum likelihood estimation (MLE) offers an integrated approach to estimating the parameters. However, MLE requires a stronger assumption that the errors of the selection and outcome equations are jointly normally distributed.

R-squared is much higher in the ad hoc regression, the results show that the coefficients vary and inferences would be very different depending on whether the model ignores the zeros (as in column 1), corrects for them (as in columns 2-4), or makes an atheoretical ad hoc adjustment (column 5).

Finally, Silva & Tenreyro (2006) point out that the presence of heteroskedasticity in trade data actually requires the use of *non* log-linearized models. Their method allows the inclusion of zero flows in the sample by estimating the gravity model with original (non-log) FDI as the dependent variable. The results from their Poisson Pseudo Maximum Likelihood (PPML) method in column 6 do not show coefficients on the FDI-related policy variables to be statistically significant, but some variables have surprising coefficients. The elasticity of distance, for example, drops by about two-third as in the main bias-corrected model. An issue with the method proposed by Silva & Tenreyro (2006) in the context of FDI flows is that it does not seek to explain zeros as anything special. In my model, zeros are intimately linked to heterogeneous productivity of firms. A zero bilateral flow indicates that firms are not finding it profitable to invest abroad because, for a given level of foreign demand, either the firm productivity is low, or the fixed and variable costs induced by distance and policy are prohibitive.

Addressing the zero observation problem (regardless of whether the selection bias is serious or not) still does not give us consistent estimates when firms are heterogeneous. In earlier trade models that follow Krugman (1979), firms are symmetric and all firms export. Only their volume is constrained by trade costs, not the decision of firms of whether to export. When trade barriers are infinite, foreign varieties are still consumed, but zero quantity of each. The effect of trade costs is only on the intensive margin of trade. Helpman et al. (2008) show that the correction of selection bias is inadequate when the assumption of symmetric firms is rejected and firms are not affected by FDI barriers in an *identical* manner.

When firms are heterogeneous, an additional bias needs to be controlled for. As FDI barriers go down, multinational firms face lower variable costs of investing abroad, so they increase their FDI. At the same time, firms that were not productive enough earlier to incur fixed costs are now in a position to do so, and contribute to increased FDI. Both the intensive and extensive margins of adjustment must be acknowledged to obtain an accurate picture of how barriers to FDI affect inflow. Ignoring the extensive margin misattributes the importance of specific barriers in restricting total investment flow because they conflate the impact of FDI barriers on these two separate margins of FDI, and render the coefficients inconsistent (Behar & Nelson 2009). This issue is addressed next, and is illustrated in Figure 6.

1.6.2 *Firm Selection Bias*

I follow the two-step methodology proposed by Helpman et al. (2008) to control for unobserved firm heterogeneity in a cross-country data set, as explained in the section on estimation strategy. Column 3 in Table 1 reports results from an NLS model that has controls for firm selection $[\ln(e^{\delta\hat{\tilde{z}}_{ij}} - 1)]$ and country selection $(\widehat{\overline{\eta}}_{ij})$. The coefficient of $\hat{\tilde{w}}_{ij}(\delta)$ is highly significant at the one percent level indicating that there is a severe truncation bias.[30] The coefficient of the inverse Mills ratio, however, is insignificant. Column 4 in Table 1 is exactly the same model as in column 3, except that it is now estimated non-parametrically by OLS after dropping the Pareto assumption and the non-linearity of the unobserved heterogeneity term, which is estimated by a polynomial in $\hat{\tilde{z}}_{ij}$ (denoted in the results tables by Z1 and Z2).

In the bias-corrected estimates of columns 3 and 4, the coefficients of FDI Arbitration and FDI Procedures are highly significant even after controlling for the general quality of institutions. Compared to the biased benchmark regression

30 In the parametric estimation, I assume delta to be 0.6.

(column 2), the elasticity of distance drops dramatically from approximately -1.5 to -0.5. The coefficient of FDI Openness is not significant.

In columns 5 and 6, I decompose the country and firm heterogeneity biases to assess which of the two biases is more prominent. Column 5 reports results controlling only for heterogeneity bias and not the selection bias. In column 6, only the sample selection bias is corrected. It is evident that the coefficients in column 5 are close to those in columns 3 and 4, whereas coefficients in column 6 are close to that obtained in the benchmark regression (column 2). This indicates that an overwhelming share of the bias has arisen because of unobserved heterogeneity. While the dominating presence of zero bilateral flows between numerous country pairs potentially posed serious selection bias, I find that in actual estimation, it is the failure to control for unobserved heterogeneity that produces most of the bias in a gravity-like model of FDI.

1.6.3 *Endogeneity Bias*

A pertinent concern in the relationship between FDI regulations and FDI inflow is that regulations could be endogenous to inflow. Improved regulation can be a response by governments to low levels of FDI, or large foreign investors can exercise their influence to lobby governments for regulatory reform *after* choosing to locate. Reverse causation of this nature would imply that errors are not independently and identically distributed leading to inconsistent estimates. Generally, while openness to FDI could be increased by "stroke-of-the-pen" reforms, improvement in institutional practices and provisions are attained only over the long run. In this paper, it is the more institutions-oriented de facto indicators of FDI Procedures and FDI Arbitration that are associated with high levels of FDI, not statutory openness. Further, case studies on FDI policy reforms suggest that major FDI inflows typically follow, not precede, reforms.

I formally test for the exogeneity of FDI regulations with three alternative instrumental variables related to land. The first index on Access to Land Information measures aspects of whether the land registry or cadastre have a publicly accessible inventory of private and public land. The second index on the Availability of Land Information scores the richness of 18 pieces of land-related information (for example, plot size, land value, address, previous contracts). And the third index captures the time taken (number of days) to lease public or private land in the host country on average (World Bank Group 2010). These instrumental variables are chosen because they are associated with the soundness of domestic institutions; but they are not a determinant of FDI in their own right because a substantial share of aggregate global FDI is in services for which access to industrial land is not as important as for FDI in manufacturing.

The tests follow a three-stage process. *First*, I conduct the Durbin-Wu-Hausman (DWH) test for the endogeneity of each of the Openness, Arbitration, and Procedures variables. After confirming a high degree of correlation between the potentially endogenous variable and its instrument, Openness is instrumented by the Access to Land Information index, FDI Arbitration is instrumented by the Availability of Land Information index, and FDI Procedures is instrumented by the time it takes to lease private land. I also instrument for all the three variables together. In all the four cases, the p-value of the DWH test is greater than 0.15, which fails to reject the null hypothesis of exogeneity of regressors.

Second, I check for the validity of the instruments in an over-identified model. None of the p-values of the Hansen's J chi-squared is less than 0.44; the null hypothesis that the overidentifying restriction is valid is not rejected. Finally, the results reject the null hypothesis of weak instruments for the Openness and Arbitration variables, but not the Procedures variable. However, when the Arbitration and Procedures variables are instrumented together in a just-identified model, the

F-statistic exceeds the critical value in the Stock-Yogo test, rejecting the null hypothesis of weak instruments.[31]

1.7 ROBUSTNESS

Three robustness checks are performed on the main bias-corrected OLS estimates reported in column 4 of Table 1. *First*, is the high statistical significance of coefficients on FDI Procedures and FDI Arbitration robust to more disaggregated controls for the quality of institutions in lieu of a single composite index? Tables 4 through 8 replicate the main result by proxying the general quality of institutions by five separate WGI variables. These five indicators are highly correlated with each other (Table 18). To avoid multi-collinearity, each is run in a separate regression.

The results for all variables concur with the main results. The coefficients for four of the five institutional variables – control of graft, regulatory quality, government effectiveness, and political stability – are not statistically significant after FDI-specific regulations are included in the bias-corrected regressions. The only coefficient attached to an institutional variable that is not statistically insignificant is the rule of law. It is *negatively* significant at the 5 percent level (column 3, Table 5). This is perhaps a result of a high degree of correlation between the rule of law and the average income level of the country. When the log of GDP per capita is not included in the regression, the coefficient on the rule of law index is no longer significant. In all results, FDI Arbitration and FDI Procedure coefficients retain their high level of significance at either the 5 or 10 percent levels. The elasticity of distance drops as dramatically as in the main result, although coefficients on other gravity variables – colonialism, contiguity and language – are affected only slightly.

31 These methods follow Cameron & Trivedi (2009) in checking for regressor endogeneity, overidentifying restrictions, and weak instruments.

In all models, the BIT coefficient is highly significant in the selection equation (column 1) and not in the benchmark outcome equation (columns 2), reaffirming its appropriateness as a candidate for exclusion restriction. It passes the prima facie test of a valid exclusion restriction by being shown to affect the propensity to invest, but not the volume of investment. This point is worth emphasizing because as appealing as the technique for controlling truncation bias is, its efficacy can be stymied by the lack of a convincing exclusion restriction. The main exclusion restriction in Helpman et al. (2008) is religion, which Anderson (2011) does not find convincing. Baranga (2009), too, finds problems with the way Helpman et al. (2008) have used the religion variable. Using an alternative but similar index yields a highly significant coefficient in the benchmark OLS regression, weakening the case for the variable's validity as an exclusion restriction.

Second, how do coefficients change when a dummy for natural resource-rich countries is added to test whether poor countries rich in oil, gas and minerals attract FDI in the extractive industries? To restrict the sample to just developing countries, I drop the FDI-receiving OECD countries. Host countries are assigned a dummy value of one if during 2002 and 2006 their average share of fuel, ores, and metal exports in total exports exceeded 20 percent.[32] In Table 9, the coefficient of the resource dummy is not statistically different from zero indicating that resource-rich developing countries are not likely to attract more FDI after controlling for FDI regulations, the quality of institutions, and other host country characteristics. The statistical significance of coefficients of the FDI Procedures and Arbitrations variables is retained.

Third, do the main results stand when alternative time periods, namely the individual years of 2006, 2007, and 2008, are considered? I do not consider years prior to 2006 because the explanatory indicators of FDI regulation cover prevailing regimes during or before 2006. Table 10 reports results obtained by estimating the model using data for 2006. GDP, GDP per capita, and tariffs averaged over the

32 Fuel products are SITC Section 3; metals and ores are SITC Divisions 27, 28, and 68.

preceding 5 years, from 2001 to 2005. The basic results not only stand, but the coefficient of FDI Arbitration increases substantially when the dependent variable uses FDI stock for the year 2006. A 10 percent increase in a country's combined score in the Ease of Process and the Judicial Assistance indices increases FDI by over 5.6 percent.

Table 11 reports results obtained by estimating the model using data for 2007. Here, both the coefficients of FDI Arbitration and FDI Procedures fall to the extent that the FDI Arbitration coefficient is statistically significant only at the 10.6 percent level.[33] It is conjectured that host country regulations and characteristics matter less when there is a global glut in investment funds. Recall that the year 2007 recorded the highest levels of outward FDI ever in the world. Total FDI stock was valued at nearly US$18 trillion and FDI flows nearly reached the US$2 trillion mark for the first time.

Table 12 reports results obtained by estimating the model using data for 2008. The estimates are comparable to the main results, except for the coefficient of the quality of institutions. As in Table 5 when it was measured by the rule of law indicator, the coefficient is negative and significant, that is, an improved measure of the rule of law is associated with lower FDI. As stated earlier, this coefficient becomes insignificant when GDP per capita is dropped from the regression.

1.8 CONCLUSION

Gravity models have long been a workhorse for explaining trade, investment, and migration flows between countries. They fit the data well, but until recently, they were seen as atheoretical (Anderson & Van Wincoop 2003). This paper uses a new empirical methodology to estimate the impact of FDI-specific institutions on FDI inflow in a theoretically derived gravity-like model.

33 It is significant at the 3 percent level if standard errors are clustered by source country, but I opt for the more conservative estimates.

The traditional estimates obtained from log-linearized models of barriers to FDI are not consistent because they do not account for all the information contained in bilateral data, especially between countries that invest zero amounts in each other (country selection problem). These models also do not acknowledge that firms are heterogeneous and only a fraction of them are in a position to invest abroad (firm selection problem). The amount of FDI between countries i and j is not just a function of low barriers to FDI, but also the fraction of firms that invest in country j from country i. Not controlling for the latter assigns exaggerated elasticities to policy costs and gravity variables by conflating the extensive and intensive margins of investment flow.

I find that FDI-specific regulations matter significantly for attracting FDI. Using a new, painstakingly prepared data set on FDI regulations across 87 countries, I show that de facto implementation of laws related to the arbitration of commercial disputes and the number of procedures required to set up wholly-owned foreign subsidiaries are strongly associated with high levels of FDI stock. These provisions proxy for the quality of FDI-specific institutions in the country, and affect FDI more directly than measures of the *general* quality of institutions.

I also show that it is how the targeted laws and regulation are translated into practice that is important rather than what is written in statutes. This is reflected by the fact that (the coefficient on) openness to FDI, measured by the average percentage of equity permitted to be owned by foreign investors, is not a significant determinant of FDI. Further, the correction of biases dramatically reduces the salience of bilateral distance – a proxy for transaction costs and information asymmetry – as a barrier to inward foreign direct investment from OECD countries.

APPENDIX

1.A DERIVING THE GRAVITY EQUATION FOR FDI WITH HETEROGENEOUS FIRMS

Consumption: A representative consumer prefers variety (v) and maximizes an iso-elastic utility function $U = [\int x(v)^{\rho} dv]^{1/\rho}$ subject to aggregate expenditure, $E = [\int p(v)x(v)$. Aggregate expenditures equal aggregate income (Y). The elasticity of substitution across products, $\sigma = 1/1-\rho$, is the same across countries. When goods 1 to n are continuous, E takes the form $\int_{\Omega} p(v)x(v)$ where Ω is the "mass" of goods. The consumer optimizes $\Lambda = U^{\rho} - [\int p(v)x(v)dv] - E]$

$$\frac{\delta \Lambda}{\delta x(v)} = \rho x(v)^{\rho-1} - \lambda p(v) = 0 \tag{1.6}$$

Relative demand for two varieties is:

$$\begin{aligned} \frac{x(v_1)}{x(v_2)} &= \left[\frac{p(v_1)}{p(v_2)}\right]^{\frac{1}{\rho-1}} \\ x(v_1) &= x(v_2)\left[\frac{p(v_1)}{p(v_2)}\right]^{\frac{1}{\rho-1}} \end{aligned} \tag{1.7}$$

Multiplying both sides of (1.7) by $p(v_1)$ and taking integral with respect to v_1, we get:

$E = x(v_2)p(v_2)^{\sigma} \int p(v_1)^{1-\sigma} dv_1$

The CES price index (true cost of living index) of all varieties is as follows: $P = \left[\int_{\Omega} p(v)^{1-\sigma} dv\right]^{\frac{1}{1-\sigma}}$.

The Marshallian demand for a variety (v) is:

$$x(v) = \frac{Ep(v)^{-\sigma}}{P^{1-\sigma}} = \left[\frac{p(v)}{P}\right]^{-\sigma} \frac{E}{P} \tag{1.8}$$

Production: A country i firm produces one unit of output with a cost-minimizing combination of inputs $(c_i a)$ where a measures the number of bundles of inputs used per unit of output; c_i is the cost of the bundle, which is uniform across country i. A firm's productivity is therefore given by $\frac{1}{a}$. Monopolistic competition with increasing returns implies decreasing average cost as quantity produced increases $[l(x) = f + cx]$. Each firm produces one distinct variety. Each country i has a continuum of firms measured by N_i. Relative size of two countries can therefore be estimated by $\frac{N_i}{N_j}$. There is no strategic interaction among firms, and they only charge a constant mark-up over the marginal cost to maximize profit as follows:

$$\begin{aligned} \pi_i &= p_i x_i - c_i a x_i - c_i f_i \\ \frac{\delta \pi}{\delta p_i} &= x_i + (p_i - c_i a)\frac{\delta x_i}{\delta p_i} = 0 \\ p_i &= c_i a - \frac{x_i}{\frac{\delta x_i}{\delta p_i}} \end{aligned} \tag{1.9}$$

Substituting $\frac{\delta x_i}{\delta p_i} = -\sigma(p)^{-\sigma-1} E P^{\sigma-1}$ in (1.9):

$$p_i = c_i a \left[\frac{\sigma}{\sigma - 1}\right] = \frac{c_i a}{\rho} \tag{1.10}$$

Investing across borders: Firms serving the foreign market through exports face higher variable costs $(\tau_{ij}^e > \tau_{ij}^f)$ and firms undertaking FDI face higher fixed costs $(f_{ij}^f > f_{ij}^e)$. Production through subsidiary in country j by parent firms in country

i reduces transport costs, but there exist non-trivial coordination and transaction costs. For exports, price in country j is $p_i \tau_{ij}^e \equiv \frac{\tau_{ij}^e c_i a}{\rho}$, which differs from price in country i by including bilateral trade costs. For FDI, or more precisely sales by foreign affiliates, the price in country j of products sold by firms headquartered in country i is:

$$p_j = \frac{\tau_{ij}^f c_j a}{\rho} \tag{1.11}$$

Note that factor cost is c_i for exporters and c_j for investors. Take $E_j = Y_j$. Substituting (1.11) in (1.9), and using (1.8), we get:

$$\begin{aligned} \pi_{ij} &= p_j x_j - c_j a x_j - c_j f_{ij}^f \\ \pi_{ij} &= (1-\rho)\left[\frac{\tau_{ij}^f c_j a}{\rho P_j}\right]^{1-\sigma} Y_j - c_j f_{ij}^f \end{aligned} \tag{1.12}$$

Productivity threshold: sale by multinational firms from i are profitable in j when $\pi_{ij} \geqslant 0$. This implies that the minimum productivity cut-off a_{ij} required to invest abroad is:

$$a_{ij} = \left[\frac{Y_j(1-\rho)}{c_j f_{ij}^f}\right]^{\frac{1}{\sigma-1}} \frac{\rho P_j}{\tau_{ij}^f c_j} \tag{1.13}$$

The cumulative distribution function of the productivity index a is assumed to be a truncated Pareto distribution with support $[a_L, a_H]$. Only firms with productivity $a_L < a < a_{ij}$ invest abroad. This is captured by the fraction of such firms $G(a_{ij}) = \frac{(a_{ij})^k - {a_L}^k}{{a_H}^k - {a_L}^k}$ where k is the shape parameter of the Pareto distribution such that $k > \sigma - 1$. Total sales generated by foreign-owned subsidiaries from i to j are $\int_{a_L}^{a_{ij}} p_j x_j N_i dG(a)$ where $G(a_{ij})$ is multiplied by N_i.

Substituting for p_j and x_j, and characterizing FDI flows $F_{ij} = \int_{a_L}^{a_{ij}} a^{1-\sigma} dG(a)$ for $a_{ij} > a_L$, we get the gravity-type equation for FDI:

$$FDI_{ij} = \left[\frac{\tau_{ij}^f c_j}{\rho P_j}\right]^{1-\sigma} Y_j N_i F_{ij} \tag{1.14}$$

Aggregate FDI sales abroad is the measure of firms N_i multiplied by the average value of FDI of a representative firm. Note that $N_{ij} = N_i G(a_{ij})$. Y_j is the economic size of the host country. F_{ij} can be expressed as $\int_{a_L}^{a_{ij}} a^{1-\sigma} dG(a) = \int_{a_L}^{a_{ij}} \frac{k a^{k-\sigma}}{{a_H}^k - {a_L}^k} da$. Further,

$$\begin{aligned} F_{ij} &= \frac{k}{{a_H}^k - {a_L}^k} * \frac{1}{k-\sigma+1}\left[a_{ij}^{k-\sigma+1} - a_L^{k-\sigma+1}\right] \\ &= \frac{k a_L^{k-\sigma+1}}{(k-\sigma+1)({a_H}^k - {a_L}^k)}\left\{\left[\frac{a_{ij}}{a_L}\right]^{k-\sigma+1} - 1\right\} \end{aligned} \tag{1.15}$$

The first multiplicative term is common across all countries; the second term is specific to i and j, and termed $W_{ij} = \left\{\left[\frac{a_{ij}}{a_L}\right]^{k-\sigma+1} - 1\right\}$. Now, log-linearizing (1.14), we can estimate FDI as in (1.16). φ_i captures all variables with subscript i as a fixed effect for the FDI source country. φ_j amalgamates country j specific variables: GDP ($\ln Y_j$), factor and policy costs ($\ln c_j$), and inward multi-lateral resistance ($\ln P_j$); w_{ij} captures the ij component of F_{ij}.

$$fdi_{ij} = \alpha_0 + \varphi_i + \varphi_j + {}_{,}d_{ij} + w_{ij} + e_{ij} \tag{1.16}$$

Sample selection: equation 1.16 is observed only for positive values of FDI, that is, $FDI_{ij} = 1$ if $z_{ij} > 0$ where z_{ij} is the latent (unobserved) variable that determines whether country pairs enter into an FDI relationship or not. This latent variable can be estimated by probit conditional on characteristics contained in the outcome equation 1.16. For identification, we need at least one variable that affects only the propensity of investing but not the actual amount of investment. In other words, this term (ϕ_{ij}) affects fixed cost, but not the variable cost. Equation 1.17 specifies the determinants of the latent variable affecting FDI participation. Equation 1.18 calculates the fitted values of the latent variable ($\hat{z}_{ij}$) through predicted probabilities of firms from country i profitably investing in country j, where Φ is the standard normal distribution.

$$z_{ij} = \gamma_0 * + \xi_j * + \zeta_i * + \gamma d_{ij} * + \kappa\phi_{ij} * + \eta_{ij} \tag{1.17}$$

$$Pr(FDI_{ij} = 1 \,|\, z_{ij} > 0) = \Phi(\gamma_0 * + \xi_j * + \zeta_i * + \gamma d_{ij} * + \kappa\phi_{ij} *) \tag{1.18}$$

Note that the error terms of the selection equation 1.17 and the outcome equation 1.16 are correlated because the unobserved factors that determine FDI participation also affect the magnitude of FDI. These two error terms are jointly normally distributed. This leads to a sample selection bias because in equation 1.16, $E[e_{ij}|FDI_{ij} = 1] \neq 0$. Under the assumptions of the model, there exists a consistent estimator of $E[e_{ij}|FDI_{ij} = 1]$ which is $\frac{\sigma_{e\eta}}{\sigma^2}\widehat{\overline{\eta}}_{ij}$, where $\widehat{\overline{\eta}}_{ij}$ is the inverse Mills ratio obtained from equation 1.18.

Unobserved heterogeneity bias: the latent variable z_{ij} is related to the productivity of the marginal FDI-undertaking firm. If this firm does not find it profitable to undertake FDI, then no firm from country i will. From equation 1.12, the ratio of profits to fixed cost of this firm can be expressed as:

$$\frac{(1-\rho)\left[\frac{c_j \tau_{ij} a_{ij}}{\rho P_j}\right]^{1-\sigma} Y_j}{c_j f_{ij}^f}$$

Now, define the latent variable $Z_{ij} = \left[\frac{a_{ij}}{a_L}\right]^{\sigma-1}$ where $Z_{ij} = exp(z_{ij})$.

From equation 1.15, $W_{ij} = (Z_{ij})^{\delta} - 1$ where $\delta = \frac{k-\sigma+1}{\sigma-1}$

Z_{ij} is unobserved, but $E[z_{ij}]$ can be estimated by $\hat{z}_{ij}$ from equation 1.18.

The insight of Helpman et al. (2008) is to show that both the sample selection and productivity heterogeneity biases can be redressed in a two-step estimation procedure beginning with the same probit selection equation. However, to prevent the model from being under-identified, this method requires at least one other variable that enters the probit equation but not the FDI outcome equation to remove the collinearity problem between $\hat{z}_{ij}$ and investment barriers. Without the extra identifying variable, $\hat{z}_{ij}$ is merely a linear combination of the same explanatory variables used in both the selection and outcome equations.

We know that $E[z_{ij}|FDI_{ij} = 1] = E[z_{ij}] + E[\eta_{ij}|FDI_{ij} = 1]$.

So, expected value of the latent variable given that the bilateral FDI flow is positive can be estimated by $\hat{\bar{z}}_{ij} = \hat{z}_{ij} + \widehat{\bar{\eta}}_{ij}$, the sum of the fitted value of the latent variable and the inverse Mills ratio.

In equation 1.16, the control for firm selection bias (w_{ij}) is $\ln\{\exp[\delta(\hat{\bar{z}}_{ij})] - 1\}$ and the control for sample selection bias is $\widehat{\bar{\eta}}_{ij}$. This is a parametric non-linear regression. When the Pareto assumption is relaxed, Helpman et al. (2008) show

that equation 1.16 can be estimated non-parametrically in an ordinary least squares (OLS) regression where sample selection is controlled by the inverse Mills ratio ($\widehat{\overline{\eta}}_{ij}$) and firm selection is controlled by a polynomial of $\hat{\hat{z}}_{ij}$.

Finally, to sum up the estimation procedure on a practical note, how do I obtain $\hat{\hat{z}}_{ij}$ and $\widehat{\overline{\eta}}_{ij}$? A probit model predicts probabilities of positive FDI from a regression that includes the standard gravity variables, host country FDI barriers and dummies for source countries. This includes the identifying variable – BIT – which is excluded in the second stage. From the predicted probabilities, an inverse Mills ratio ($\widehat{\overline{\eta}}_{ij}$) is computed. Because the inverse Mills ratio would be undefined for predicted probabilities of 1, all probabilities > 0.9999999 are converted to equal 0.9999999. Next, the fitted values of the latent variable $\hat{z}_{ij} = \Phi^{-1}(\hat{p}_{ij})$ are obtained from the normalized predicted probabilities. This is added to the inverse Mills ratio to obtain $\hat{\hat{z}}_{ij} = \hat{z}_{ij} + \widehat{\overline{\eta}}_{ij}$.

1.B FIRM PRODUCTIVITY, EXPORTS, AND HORIZONTAL FDI

The model is from Helpman et al. (2004) and Helpman (2006) where firms vary by productivity which is discovered after entering the industry. Factor cost (c) is country-specific and productivity (inverse of a) is firm-specific. Fixed cost of serving the domestic market is cf_D and the firm charges a marked-up price to maximize profit as follows:

$$\pi_D(\Theta) = \theta(\nu)^{\sigma-1}B - cf_D, \text{ where } B = A(1-\rho)(\tfrac{c}{\rho})^{1-\sigma}$$

If a firm sells in a foreign country with the same demand elasticity (σ) but different demand function, and faces transport and transaction cost as well as fixed export cost, cf_X, it makes additional profit from exports as follows:

$$\pi_X(\Theta) \quad = \quad \tau^{1-\sigma}\Theta B^j - cf_X \quad \text{where } \Theta = \theta(v)^{\sigma-1}$$

Firms with productivity $\Theta_D < \Theta < \Theta_X^j$ produce for the domestic market. Those with productivity $\Theta > \Theta_X^j$ export. A firm that undertakes horizontal FDI builds a second plant in country j incurring fixed cost cf_I and variable cost $c_j a$ to reap profit as follows:

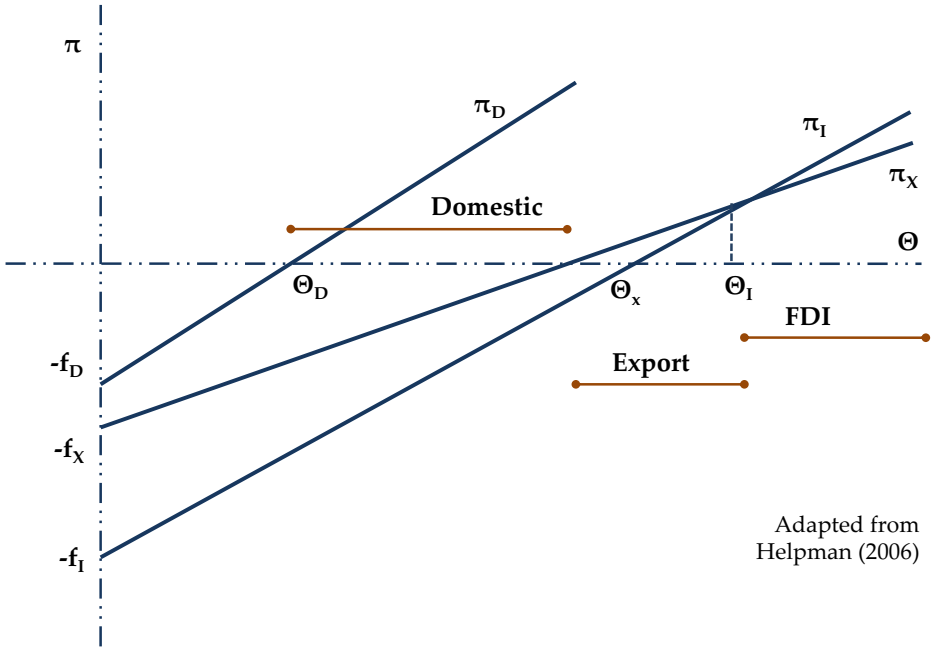
$$\pi_I(\Theta) \quad = \quad \Theta B^j - cf_I$$

For the case in which demand level is the same in two countries, $B^j = B$, $c_j = c$ and $f_I > \tau^{\sigma-1} f_X > f_D$, the model shows:

$$\Theta_D \quad < \Theta_X^j < \quad \Theta_I^j$$

This leads to a natural sorting of firms by productivity. If the liberalization of trade or investment reduces marginal costs, not only can firms trade or invest more, but new firms can participate in foreign trade or investment as the productivity cut-off required to do so falls. In Figure 9, the profit schedules π_I and π_X swivel backwards. As an example, Baldwin et al. (2003) found that 4.5 percent reduction in Canada-US tariffs increased firms' propensity to export by 63 percent.

Figure 9: Sorting of Firms by Productivity



REFERENCES

Alfaro, L., Kalemli-Ozcan, S. & Volosovych, V. (2008), 'Why does not capital flow from rich to poor countries? An empirical investigation', *Review of Economics and Statistics* **90**, 347–368.

Anderson, J. E. (2011), 'The Gravity Model', *Annual Review of Economics* **3**, 133–160.

Anderson, J. & Van Wincoop, E. (2003), 'Gravity with gravitas: a solution to the border puzzle', *The American Economic Review* **93**(1), 170–192.

Arnold, J. & Hussinger, K. (2005), 'Export behavior and firm productivity in German manufacturing: a firm-level analysis', *Review of World Economics* **141**(2), 219–243.

ASEAN (2010), *ASEAN Community In Figures 2010*, ASEAN Secretariat: Jakarta.

Baldwin, J., Russel, J., Division, S. C. M.-E. A. & Gu, W. (2003), *Participation in export markets and productivity performance in Canadian manufacturing*, Statistics Canada: Ottawa.

Balistreri, E., Hillberry, R. & Rutherford, T. (2011), 'Structural estimation and solution of international trade models with heterogeneous firms', *Journal of International Economics* .

Baranga, T. (2009), 'Unreported trade flows and gravity equation estimation'. Draft.

Barro, R. & Lee, J. (2010), 'A new data set of educational attainment in the world, 1950–2010', *NBER Working Paper No.* **15902**.

Behar, A. B. & Nelson, B. D. (2009), 'Trade flows, multilateral resistance and firm heterogeneity', *University of Oxford Discussion Paper Series No.* **440**.

Bénassy-Quéré, A., Coupet, M. & Mayer, T. (2007), 'Institutional determinants of foreign direct investment', *World Economy* **30**(5), 764–782.

Bergeijk, P. & Brakman, S. (2010), *The Gravity Model in International Trade: Advances and Applications*, Cambridge University Press: Cambridge.

Bergstrand, J. & Egger, P. (2009), 'Gravity equations and economic frictions in the world economy', *Palgrave Handbook of International Trade* . Palgrave-Macmillan Press, forthcoming.

Blonigen, B. (2005), 'A review of the empirical literature on FDI determinants', *Atlantic Economic Journal* **33**(4), 383–403.

Brainard, S. L. (1997), 'An empirical assessment of the proximity-concentration trade-off between multinational sales and trade', *The American Economic Review* **87**(4), 520–544.

Cameron, A. & Trivedi, P. (2009), *Microeconomics using Stata*, StataCorp: Texas.

CEPII (2010), 'The CEPII Gravity Dataset'. Accessed November 10, 2010 <http://www.cepii.fr/anglaisgraph/bdd/gravity.htm>.

Chen, M. X. & Moore, M. O. (2010), 'Location decision of heterogeneous multinational firms', *Journal of International Economics* **80**(2), 188 – 199.

Daude, C. & Stein, E. (2007), 'The quality of institutions and foreign direct investment', *Economics & Politics* **19**(3), 317–344.

Dee, P. (2003), 'Modelling the policy issues in services trade', *Économie internationale* (2), 283–300.

Dunning, J. (1977), Trade, location of economic activity and the MNE: a search for an eclectic paradigm, *in* 'The International Allocation of Economic Activities: Proceedings of a Nobel Symposium in Stockholm', Macmillan: London.

Dunning, J. (1993), *Multinational Enterprises and the Global Economy*, Addison-Wesley Publishing.

Fan, J., Morck, R., Xu, L. & Yeung, B. (2009), 'Institutions and foreign direct investment: China versus the rest of the world', *World Development* **37**(4), 852–865.

Girma, S., K. R. & Pisu, M. (2005), 'Exports versus FDI: an empirical test', *Review of World Economics* **141**(2), 193–218.

Girma, S. et al. (2004), 'Does exporting increase productivity? A microeconometric analysis of matched firms', *Review of International Economics* **12**(5), 855–866.

Greenaway, D. & Kneller, R. (2007), 'Firm heterogeneity, exporting and foreign direct investment', *The Economic Journal* **117**(517), 134–161.

Helpman, E. (1984), 'A simple theory of international trade with multinational corporations', *The Journal of Political Economy* **92**(3), 451–471.

Helpman, E. (2006), 'Trade, FDI, and the organization of firms', *Journal of Economic Literature* **44**(3), 589–630.

Helpman, E. (2011), *Understanding Global Trade*, Belknap Harvard.

Helpman, E., Melitz, M. & Rubinstein, Y. (2008), 'Estimating trade flows: trading partners and trading volumes', *Quarterly Journal of Economics* **123**(2), 441–487.

Helpman, E., Melitz, M. & Yeaple, S. (2004), 'Export versus FDI with heterogeneous firms', *The American Economic Review* **94**(1), 300–316.

Hines, J. R. (1995), 'Forbidden payment: foreign bribery and American business after 1977', *NBER Working Papers No.* **5266**.

Hirschman, A. (1970), *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*, Harvard University Press.

Holmes, L. & Hardin, A. (2000), Assessing Barriers to Services Sector Investment, *in* C. Findlay & T. Warren, eds, 'Impediments to Trade in Services: Measurement and Policy Implications', Routledge.

Kaufmann, D., Kraay, A. & Mastruzzi, M. (2007), 'The worldwide governance indicators project: answering the critics'. World Bank Draft.

Kaufmann, D., Kraay, A. & Mastruzzi, M. (2010), 'The worldwide governance indicators: methodology and analytical issues', *World Bank Policy Research Working Paper No.* **5430**.

Kinda, T. (2010), 'Investment climate and FDI in developing countries: firm-level evidence', *World Development* **38**(4), 498 – 513.

Krugman, P. (1979), 'Increasing returns, monopolistic competition, and international trade', *Journal of International Economics* **9**(4), 469–479.

La Porta, R., Lopez-de Silanes, F., Shleifer, A. & Vishny, R. (1999), 'The quality of government', *Journal of Law, Economics, and Organization* **15**(1), 222.

Lerner, J. & Schoar, A. (2005), 'Does legal enforcement affect financial transactions? The contractual channel in private equity', *The Quarterly Journal of Economics* **120**(1), 223.

Malik, M. (2006), 'Bilateral Investment Treaties of South Asian States: Implications for Development'. UNDP Regional Center (Colombo) Draft.

Markusen, J. (1984), 'Multinationals, multi-plant economies, and the gains from trade', *Journal of International Economics* **16**(3-4), 205–226.

Markusen, J. (1997), 'Trade versus investment liberalization', *NBER Working Papers No.* **6231**.

Melitz, M. (2003), 'The impact of trade on intra-industry reallocations and aggregate industry productivity', *Econometrica* **71**(6), 1695–1725.

Mottaleb, K. & Kalirajan, K. (2010), 'Determinants of foreign direct investment in developing countries: A comparative analysis', *ASARC Working Papers No.* **13**.

Moulton, B. (1990), 'An illustration of a pitfall in estimating the effects of aggregate variables on micro units', *Review of Economics and Statistics* **72**(2), 334–338.

OECD (2011), *OECD International Direct Investment Statistics 2011*, OECD Publishing: Paris.

Rodrik, D., Trebbi, F. & Subramanian, A. (2002), 'Institutions rule: the primacy of institutions over integration and geography in economic development', *IMF Working Papers No.* **189 (WP/02)**.

Silva, J. & Tenreyro, S. (2006), 'The log of gravity', *The Review of Economics and Statistics* **88**(4), 641–658.

Stein, E. & Daude, C. (2002), Institutions, integration and the location of foreign direct investment, *in* 'New Horizons of Foreign Direct Investment', OECD Global Forum on International Investment.

The Economist (2008), 'Economics and the rule of law: order in the jungle', *The Economist* **(March 13)**.

Thomas, M. (2006), 'What do the worldwide governance indicators measure?'. Johns Hopkins University Draft.

Tolstoy, L. (1995), *Anna Karenina*, Wordsworth Editions Limited: Ware.

UNCTAD (2010), 'Investment Instruments Online: Bilateral Investment Treaties'. Accessed August 12, 2010 <http://www.unctadxi.org>.

UNCTAD (2011), *World Investment Report 2011: Non-Equity Modes of International Production and Development*, UNCTAD: Geneva.

UNDP (2010), *Human Development Report 2010*, Oxford University Press: Oxford.

Verbeek, M. (2004), *A Guide to Modern Econometrics*, Wiley.

Wei, S. (2000), 'How taxing is corruption on international investors?', *Review of Economics and Statistics* **82**(1), 1–11.

Wei, S. & Shleifer, A. (2000), 'Local corruption and global capital flows', *Brookings Papers on Economic Activity* **2000**(2), 303–354.

Wheeler, D. & Mody, A. (1992), 'International investment location decisions: The case of US firms', *Journal of International Economics* **33**(1-2), 57–76.

World Bank (2010), *Migration and Remittances Factbook 2011*, World Bank: Washington, D.C.

World Bank (2011), 'World Development Indicators'. Accessed November 10, 2010 <http://data.worldbank.org/data-catalog/world-development-indicators>.

World Bank Group (2010), *Investing Across Borders 2010: Indicators of Foreign Direct Investment Regulation in 87 Economies*, World Bank: Washington, D.C.

World Trade Organization (2008), *World Trade Report 2008: Trade in a Globalizing World*, WTO: Geneva.

Yeaple, S. (2003), 'The complex integration strategies of multinationals', *Journal of International Economics* **60**(2), 293–314.

1.C ADDITIONAL TABLES

Table 3: Addressing the Zero Problem

	(1) Zero Dropped	(2) MLE	(3) 2 Step Auto	(4) 2 Step Manual	(5) Ad-hoc	(6) Poisson
FDI Procedures	.458**	.453***	.457***	.457**	.156	.026
	(.197)	(.125)	(.125)	(.203)	(.103)	(.182)
FDI Arbitration	.260	.305*	.300*	.300	-.187	.226
	(.206)	(.177)	(.177)	(.206)	(.140)	(.594)
FDI Openness	.054	.060	.061	.061	.069	.338
	(.128)	(.110)	(.110)	(.126)	(.092)	(.244)
Quality of Institutions	-.111	-.127	-.132	-.132	.377**	.284
	(.203)	(.153)	(.153)	(.207)	(.144)	(.233)
GDP	.857***	.851***	.842***	.842***	.820***	.738***
	(.083)	(.052)	(.055)	(.092)	(.070)	(.075)
GDP Per Capita	.036	.003	.008	.008	-.096	.027
	(.184)	(.116)	(.117)	(.180)	(.125)	(.214)
Weighted Tariff	-.390**	-.389***	-.387***	-.387*	-.398***	-.191
	(.196)	(.133)	(.133)	(.196)	(.149)	(.286)
School (Mean Years)	.295	.336	.323	.323	.300**	-.112
	(.305)	(.224)	(.225)	(.302)	(.124)	(.499)
Remoteness	2.822***	2.812***	2.787***	2.787***	2.845***	.468
	(.669)	(.395)	(.397)	(.692)	(.444)	(.587)
Distance	-1.382***	-1.380***	-1.364***	-1.364***	-1.395***	-.513***
	(.147)	(.122)	(.126)	(.155)	(.107)	(.083)
Contiguity	1.083**	1.074***	1.080***	1.080**	.937**	-.208
	(.454)	(.347)	(.347)	(.448)	(.449)	(.230)
Colony	.938***	.943***	.937***	.937***	1.070***	.442**
	(.311)	(.290)	(.291)	(.306)	(.316)	(.222)
Language	.889***	.840***	.836***	.836***	.858***	.900***
	(.260)	(.237)	(.237)	(.265)	(.231)	(.226)
Bilateral Investment Treaty	.267				.117	.135
	(.179)				(.124)	(.143)
Inverse Mills Ratio			-.179	-.179		
			(.239)	(.378)		
No.	912	1578	1578	912	1578	1578
Adj. R-sq.	.66			.66	.76	

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 4: General Quality of Institutions (Graft)

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.061	.456**	.494**	.509**	.460**
	(.088)	(.197)	(.201)	(.199)	(.203)
FDI Arbitration	-.126**	.247	.368*	.321	.284
	(.062)	(.205)	(.197)	(.194)	(.205)
FDI Openness	-.112	.058	.126	.120	.065
	(.102)	(.125)	(.127)	(.121)	(.123)
Control of Graft	.292**	-.073	-.209	-.216	-.100
	(.141)	(.187)	(.188)	(.191)	(.188)
GDP	.627***	.857***	.504***	.493***	.839***
	(.068)	(.082)	(.136)	(.124)	(.092)
GDP Per Capita	-.176	.026	.110	.113	.005
	(.120)	(.196)	(.197)	(.199)	(.194)
Weighted Tariff	-.299**	-.378*	-.185	-.192	-.375*
	(.140)	(.191)	(.205)	(.202)	(.192)
School (Mean Years)	.595***	.291	-.079	-.083	.305
	(.188)	(.306)	(.333)	(.327)	(.303)
Remoteness	2.842***	2.823***	1.475*	1.397*	2.786***
	(.464)	(.677)	(.823)	(.735)	(.700)
Distance	-1.572***	-1.381***	-.574**	-.542**	-1.358***
	(.168)	(.147)	(.268)	(.225)	(.156)
Contiguity	.352	1.080**	1.059**	1.040**	1.077**
	(.611)	(.457)	(.427)	(.431)	(.450)
Colony	.652*	.936***	.600*	.563*	.933***
	(.366)	(.311)	(.314)	(.298)	(.306)
Language	.615***	.887***	.509*	.514*	.836***
	(.229)	(.260)	(.279)	(.277)	(.266)
Bilateral Investment Treaty	.413***	.263			
	(.141)	(.180)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			.011		-.203
			(.602)		(.381)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$			1.181***		
			(.403)		
Z1*Z1			-.075		
			(.071)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.656***	
				(.149)	
No.	1578	912	912	912	912
Adj. R-sq.		.66	.67	.66	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 5: General Quality of Institutions (Rule of Law)

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.048	.476**	.511**	.526***	.477**
	(.092)	(.190)	(.196)	(.193)	(.196)
FDI Arbitration	-.136**	.278	.409*	.363*	.314
	(.065)	(.213)	(.206)	(.203)	(.213)
FDI Openness	-.097	.046	.109	.100	.051
	(.112)	(.132)	(.134)	(.128)	(.130)
Rule of Law	.277**	-.199	-.348**	-.353**	-.217
	(.122)	(.166)	(.169)	(.171)	(.170)
GDP	.617***	.863***	.511***	.505***	.846***
	(.067)	(.085)	(.133)	(.124)	(.094)
GDP Per Capita	-.139	.080	.155	.156	.052
	(.100)	(.171)	(.170)	(.171)	(.166)
Weighted Tariff	-.293**	-.399**	-.212	-.221	-.395**
	(.132)	(.191)	(.202)	(.199)	(.191)
School (Mean Years)	.541***	.264	-.088	-.087	.287
	(.176)	(.301)	(.325)	(.319)	(.298)
Remoteness	2.886***	2.818***	1.443*	1.384*	2.775***
	(.459)	(.666)	(.803)	(.720)	(.690)
Distance	-1.576***	-1.382***	-.564**	-.543**	-1.360***
	(.168)	(.146)	(.265)	(.225)	(.156)
Contiguity	.342	1.072**	1.056**	1.040**	1.070**
	(.610)	(.457)	(.430)	(.433)	(.450)
Colony	.646*	.951***	.616**	.587**	.947***
	(.365)	(.308)	(.307)	(.293)	(.303)
Language	.606***	.914***	.536*	.548*	.863***
	(.226)	(.263)	(.278)	(.277)	(.269)
Bilateral Investment Treaty	.403***	.257			
	(.141)	(.179)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			-.013		-.196
			(.608)		(.380)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$			1.152***		
			(.411)		
Z1*Z1			-.069		
			(.071)		
H1 $\left(\Phi^{-1}(\hat{p}r)\right)$				.654***	
				(.147)	
No.	1578	912	912	912	912
Adj. R-sq.		.66	.67	.67	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 6: General Quality of Institutions (Regulatory Quality)

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.033	.437**	.463**	.479**	.435**
	(.092)	(.206)	(.211)	(.208)	(.213)
FDI Arbitration	-.163**	.222	.376*	.328*	.262
	(.073)	(.207)	(.198)	(.196)	(.206)
FDI Openness	-.130	.053	.136	.127	.061
	(.113)	(.125)	(.126)	(.120)	(.123)
Regulatory Quality	.323**	.032	-.150	-.164	.014
	(.154)	(.249)	(.244)	(.250)	(.252)
GDP	.618***	.857***	.505***	.494***	.841***
	(.067)	(.082)	(.139)	(.125)	(.091)
GDP Per Capita	-.136	-.029	.046	.050	-.060
	(.102)	(.192)	(.191)	(.193)	(.189)
Weighted Tariff	-.230	-.355	-.205	-.215	-.353
	(.149)	(.213)	(.225)	(.221)	(.213)
School (Mean Years)	.546***	.334	-.025	-.026	.363
	(.174)	(.311)	(.338)	(.330)	(.308)
Remoteness	2.876***	2.783***	1.418*	1.337*	2.745***
	(.467)	(.678)	(.842)	(.738)	(.701)
Distance	-1.592***	-1.381***	-.553**	-.520**	-1.361***
	(.164)	(.147)	(.278)	(.227)	(.155)
Contiguity	.281	1.085**	1.103**	1.084**	1.083**
	(.610)	(.452)	(.429)	(.433)	(.445)
Colony	.641*	.926***	.596*	.560*	.924***
	(.362)	(.312)	(.314)	(.298)	(.306)
Language	.627***	.867***	.482*	.491*	.814***
	(.226)	(.251)	(.273)	(.269)	(.257)
Bilateral Investment Treaty	.409***	.272			
	(.140)	(.179)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			.030		-.186
			(.602)		(.377)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$			1.209***		
			(.401)		
Z1*Z1			-.078		
			(.071)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.663***	
				(.150)	
No.	1578	912	912	912	912
Adj. R-sq.		.66	.67	.66	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 7: General Quality of Institutions (Government Effectiveness)

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.048	.456**	.492**	.506**	.455**
	(.091)	(.197)	(.202)	(.200)	(.204)
FDI Arbitration	-.150**	.266	.410**	.362*	.306
	(.067)	(.202)	(.192)	(.191)	(.202)
FDI Openness	-.107	.052	.121	.112	.058
	(.108)	(.130)	(.131)	(.125)	(.128)
Govt. Effectiveness	.352**	-.119	-.316	-.322	-.139
	(.153)	(.224)	(.222)	(.227)	(.226)
GDP	.599***	.863***	.518***	.512***	.849***
	(.068)	(.086)	(.137)	(.126)	(.095)
GDP Per Capita	-.153	.037	.120	.122	.008
	(.104)	(.188)	(.187)	(.190)	(.184)
Weighted Tariff	-.252*	-.395**	-.228	-.238	-.392*
	(.147)	(.197)	(.208)	(.205)	(.197)
School (Mean Years)	.552***	.291	-.071	-.071	.318
	(.174)	(.303)	(.329)	(.322)	(.300)
Remoteness	2.859***	2.829***	1.445*	1.392*	2.793***
	(.469)	(.681)	(.829)	(.742)	(.705)
Distance	-1.582***	-1.381***	-.548**	-.529**	-1.362***
	(.167)	(.146)	(.271)	(.229)	(.156)
Contiguity	.317	1.085**	1.079**	1.066**	1.082**
	(.611)	(.453)	(.427)	(.431)	(.447)
Colony	.638*	.941***	.601*	.573*	.940***
	(.367)	(.314)	(.317)	(.300)	(.309)
Language	.602***	.888***	.510*	.522*	.836***
	(.222)	(.258)	(.274)	(.273)	(.264)
Bilateral Investment Treaty	.394***	.265			
	(.139)	(.180)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			.002		-.180
			(.609)		(.379)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$			1.176***		
			(.410)		
Z1*Z1			-.071		
			(.071)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.663***	
				(.151)	
No.	1578	912	912	912	912
Adj. R-sq.		.66	.67	.67	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 8: General Quality of Institutions (Political Stability)

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.048	.443**	.482**	.498**	.441**
	(.081)	(.197)	(.203)	(.200)	(.204)
FDI Arbitration	-.132**	.236	.373*	.332	.268
	(.059)	(.208)	(.204)	(.202)	(.209)
FDI Openness	-.119	.054	.136	.126	.061
	(.118)	(.127)	(.129)	(.123)	(.125)
Political Stability	.247**	-.019	-.184	-.193	-.016
	(.109)	(.161)	(.174)	(.167)	(.161)
GDP	.644***	.855***	.462***	.448***	.836***
	(.074)	(.086)	(.146)	(.132)	(.097)
GDP Per Capita	-.146	-.008	.088	.090	-.047
	(.101)	(.172)	(.173)	(.173)	(.162)
Weighted Tariff	-.300**	-.369*	-.173	-.176	-.359*
	(.131)	(.190)	(.200)	(.198)	(.190)
Schooling (Mean Years)	.532***	.327	-.050	-.048	.355
	(.185)	(.309)	(.336)	(.329)	(.306)
Remoteness	2.804***	2.796***	1.385*	1.280*	2.743***
	(.444)	(.648)	(.798)	(.713)	(.677)
Distance	-1.540***	-1.382***	-.528*	-.488**	-1.356***
	(.169)	(.145)	(.269)	(.227)	(.156)
Contiguity	.396	1.086**	1.038**	1.010**	1.086**
	(.630)	(.453)	(.421)	(.430)	(.447)
Colony	.685*	.929***	.559*	.515*	.923***
	(.364)	(.307)	(.305)	(.292)	(.303)
Language	.694***	.872***	.419	.423	.813***
	(.222)	(.257)	(.284)	(.280)	(.263)
Bilateral Investment Treaty	.381***	.273			
	(.140)	(.184)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}_{ij}^{*}\right)$			-.060		-.216
			(.614)		(.389)
Z1 $\left(\hat{\bar{z}}_{ij}^{*}\right)$			1.224***		
			(.413)		
Z1*Z1			-.076		
			(.073)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.706***	
				(.155)	
No.	1578	912	912	912	912
Adj. R-sq.		.66	.67	.67	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 9: Dummy for Resource Rich Countries

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.032	.356**	.334**	.356**	.329**
	(.092)	(.149)	(.149)	(.152)	(.151)
FDI Arbitration	-.153**	.240	.376**	.321*	.281
	(.065)	(.195)	(.187)	(.183)	(.190)
FDI Openness	-.086	.082	.126	.112	.093
	(.119)	(.130)	(.136)	(.130)	(.131)
Quality of Institutions	.224	-.173	-.255	-.257	-.118
	(.178)	(.211)	(.218)	(.216)	(.202)
GDP	.669***	.941***	.673***	.663***	.978***
	(.068)	(.081)	(.162)	(.149)	(.088)
GDP Per Capita	-.185	.159	.221	.219	.123
	(.121)	(.184)	(.187)	(.190)	(.178)
Distance	-1.835***	-1.937***	-1.282**	-1.222***	-2.024***
	(.203)	(.190)	(.496)	(.418)	(.187)
Remoteness	3.886***	4.692***	3.335**	3.177**	4.745***
	(.602)	(.722)	(1.328)	(1.198)	(.762)
Weighted Tariff (Manu)	-.291*	-.479**	-.355	-.360	-.479**
	(.151)	(.233)	(.228)	(.228)	(.227)
School (Mean Years)	.591***	.106	-.162	-.137	.170
	(.197)	(.331)	(.396)	(.392)	(.335)
Resource Dummy	-.086	-.086	-.053	-.046	-.084
	(.192)	(.226)	(.235)	(.231)	(.223)
Contiguity	.221	2.305***	2.127**	2.149***	2.332***
	(.613)	(.774)	(.818)	(.789)	(.787)
Bilateral Investment Treaty	.491***	.296			
	(.151)	(.219)			
Inverse Mills Ratio $\left(\hat{\bar{\eta}}^{*}_{ij}\right)$			.335		.177
			(.686)		(.426)
Z1 $\left(\hat{\bar{z}}^{*}_{ij}\right)$			1.222**		
			(.510)		
Z1*Z1			-.119		
			(.094)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.444*	
				(.236)	
No.	1220	622	622	622	622
Adj. R-sq.		.62	.63	.62	.62

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 10: Regressions: FDI Stock in 2006

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.130*	.370**	.415***	.437***	.341**
	(.076)	(.155)	(.154)	(.151)	(.157)
FDI Arbitration	-.160*	.491***	.565***	.535***	.513***
	(.096)	(.152)	(.130)	(.139)	(.133)
FDI Openness	-.056	.007	.054	.032	.010
	(.088)	(.112)	(.116)	(.109)	(.115)
Quality of Institutions	.437***	-.080	-.254	-.242	-.049
	(.164)	(.214)	(.204)	(.209)	(.212)
GDP (2001-05)	.756***	.868***	.498***	.575***	.917***
	(.080)	(.080)	(.162)	(.134)	(.086)
GDP Per Capita (2001-05)	-.340***	.062	.228	.203	.020
	(.103)	(.169)	(.174)	(.173)	(.166)
Weighted Tariff (2001-05)	-.286*	-.221	-.073	-.113	-.231
	(.161)	(.198)	(.208)	(.205)	(.201)
School (Mean Years)	.537***	.492*	.191	.235	.578**
	(.206)	(.247)	(.256)	(.255)	(.250)
Remoteness	2.006***	2.621***	1.784**	1.974***	2.708***
	(.465)	(.655)	(.691)	(.639)	(.674)
Distance	-1.289***	-1.272***	-.675***	-.807***	-1.344***
	(.161)	(.136)	(.214)	(.179)	(.146)
Contiguity	.815	1.116**	.918**	.962**	1.127**
	(.570)	(.469)	(.433)	(.434)	(.475)
Colony	.793*	.783**	.408	.488	.825**
	(.432)	(.332)	(.361)	(.339)	(.333)
Language	.782***	.630**	.206	.316	.649**
	(.176)	(.264)	(.285)	(.286)	(.269)
Bilateral Investment Treaty	.273*	.072			
	(.153)	(.183)			
Inverse Mills Ratio $\left(\hat{\tilde{\eta}}_{ij}^{*}\right)$			.560		.495
			(.572)		(.372)
Z1 $\left(\hat{\tilde{z}}_{ij}^{*}\right)$			1.055***		
			(.393)		
Z1*Z1			-.051		
			(.069)		
H1 $\left(\Phi^{-1}(\hat{pr})\right)$				.447***	
				(.149)	
No.	1561	881	881	881	881
Adj. R-sq.		.67	.68	.68	.68

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 11: Regressions: FDI Stock in 2007

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.110	.333*	.380**	.393**	.333*
	(.106)	(.187)	(.183)	(.182)	(.191)
FDI Arbitration	-.169***	.249	.314	.288	.268
	(.062)	(.206)	(.192)	(.197)	(.201)
FDI Openness	-.080	.054	.098	.084	.055
	(.124)	(.123)	(.126)	(.120)	(.122)
Quality of Institutions	.449***	-.022	-.173	-.179	-.034
	(.158)	(.196)	(.195)	(.199)	(.199)
GDP	.704***	.836***	.563***	.568***	.830***
	(.070)	(.078)	(.144)	(.128)	(.086)
GDP Per Capita	-.306***	.028	.164	.162	.018
	(.107)	(.179)	(.188)	(.187)	(.176)
Weighted Tariff (Manu)	-.353**	-.359**	-.208	-.221	-.357**
	(.146)	(.170)	(.185)	(.176)	(.169)
School (Mean Years)	.477**	.293	.037	.047	.310
	(.198)	(.285)	(.304)	(.295)	(.279)
Remoteness	2.543***	2.635***	1.818**	1.828**	2.628***
	(.475)	(.673)	(.802)	(.730)	(.682)
Distance	-1.530***	-1.367***	-.818***	-.832***	-1.362***
	(.177)	(.142)	(.264)	(.227)	(.151)
Contiguity	.885	1.069**	.953**	.938**	1.058**
	(.614)	(.431)	(.384)	(.394)	(.421)
Colony	.494	.926***	.740**	.732**	.929***
	(.423)	(.321)	(.324)	(.312)	(.318)
Language	.908***	.740***	.379	.409	.717**
	(.232)	(.279)	(.302)	(.301)	(.284)
Bilateral Investment Treaty	.520***	.105			
	(.139)	(.179)			
Inverse Mills Ratio			.126		-.064
			(.679)		(.412)
Z1			.829*		
			(.444)		
Z2			-.049		
			(.074)		
H1				.435***	
				(.146)	
No.	1636	939	939	939	939
Adj. R-sq.		.66	.67	.67	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 12: Regressions: FDI Stock in 2008

	(1) Probit	(2) Benchmark	(3) Heterogeneity	(4) Bias I	(5) Bias II
FDI Procedures	-.051	.423**	.455**	.477**	.415**
	(.087)	(.188)	(.192)	(.191)	(.192)
FDI Arbitration	-.178***	.260	.435**	.372**	.301
	(.061)	(.194)	(.178)	(.181)	(.187)
FDI Openness	-.114	-.007	.075	.057	-.000
	(.086)	(.109)	(.112)	(.106)	(.108)
Quality of Institutions	.389**	-.155	-.381**	-.387**	-.160
	(.156)	(.187)	(.190)	(.194)	(.188)
GDP	.629***	.847***	.463***	.464***	.856***
	(.065)	(.086)	(.133)	(.123)	(.094)
GDP Per Capita	-.215*	.054	.185	.187	.024
	(.110)	(.180)	(.180)	(.184)	(.175)
Weighted Tariff (Manu)	-.219	-.279	-.115	-.137	-.282
	(.144)	(.189)	(.196)	(.195)	(.189)
School (Mean Years)	.630***	.518*	.100	.089	.567*
	(.185)	(.299)	(.333)	(.318)	(.298)
Remoteness	2.884***	2.736***	1.268*	1.233*	2.769***
	(.442)	(.635)	(.741)	(.648)	(.667)
Distance	-1.569***	-1.340***	-.462*	-.465**	-1.365***
	(.168)	(.147)	(.235)	(.198)	(.155)
Contiguity	.568	1.041**	.874**	.869**	1.031**
	(.619)	(.442)	(.409)	(.416)	(.442)
Colony	.751**	.686**	.284	.252	.695**
	(.377)	(.306)	(.307)	(.297)	(.307)
Language	.626***	.769***	.345	.385	.735***
	(.224)	(.251)	(.271)	(.269)	(.257)
Bilateral Investment Treaty	.312**	.194			
	(.145)	(.177)			
Inverse Mills Ratio			.271		.062
			(.529)		(.355)
Z1			1.416***		
			(.399)		
Z2			-.096		
			(.071)		
H1				.684***	
				(.140)	
No.	1532	853	853	853	853
Adj. R-sq.		.66	.67	.67	.66

Note 1: robust standard errors, clustered by host country, reported in parenthesis

Note 2: statistical significance indicated as * for p<0.1, ** for p<0.05, and *** for p<0.01

Table 13: Description and Source of Variables

Variables	Description	Source
Stock of FDI	Log of absolute FDI stock (in US$ million) between two countries. (The main regression results average FDI stock from 2007 to 2008: robustness results use values for individual years 2006, 2007, 2008)	OECD
FDI Arbitration	Log of index (0 to 100) created by averaging two separate IAB indices: (i) the Ease of Arbitration Process and (ii) the Extent of Judicial Assistance. The former assesses whether there are obstacles that the disputing parties face in seeking a resolution to their dispute; and the latter measures the interaction between domestic courts and arbitral tribunals, including the courts' willingness to assist during the arbitration process and their effectiveness in enforcing arbitration awards.	IAB
FDI Procedures	Log of index (0 to 100) derived by normalizing the number of pre- and post-incorporation procedural steps required to set up a wholly foreign-owned subsidiary.	IAB
FDI Openness	Log of index (0 to 100) of average percentage of foreign equity ownership permitted across 2 primary sectors (mining and oil and gas; agriculture and forestry), 1 light manufacturing sector, and 8 services sectors (from banking and telecommunications to transport and electricity).	IAB
General Quality of Institutions	Weighted sum of five indicators of the World Governance Indicators (WGI). Weights derived from principle components. (1) Control of Graft measures the extent to which public power is exercised for private gain, as well as capture of the state by elites and private interests. (2) Rule of Law measures the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. (3) Government Effectiveness measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. (4) Regulatory Quality measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. (5) Political Stability captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	Computed by author from Kaufmann et al. (2010)
GDP	Gross domestic product in current US dollar.	WDI

GDP per capita	Gross domestic product per capita in current US dollar.	WDI
Weighted Tariff	Weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. When the effectively applied rate is unavailable, the most favored nation rate is used. Manufactured products are commodities classified in SITC revision 3 sections 5-8 excluding division 68.	WDI
School	Log of average number of years of education received by people aged 25 and older in the lifetime based on education attainment levels of the population converted into years of schooling based on theoretical durations of each level of education.	Barro and Lee (2010)
Remoteness	Log of the sum of a country's bilateral distance with all other countries in the world, weighted by the share of the GDP of the partner country in total world GDP.	Computed by author
Distance	Distance in kilometers between two countries using the great circle formula which uses latitudes and longitudes of each country's most populated cities or official capital.	CEPII
Contiguity	1 for pairs of countries that share a border; 0 otherwise	CEPII
Colony	1 for pairs of countries ever in a colonial relationship; 0 otherwise	CEPII
Language (ethnic)	1 if a language is spoken by at least 9 percent of the population in both countries; 0 otherwise.	CEPII
Bilateral Investment Treaty	1 for pairs of countries that have a bilateral investment treaty in force as of 2005; 0 otherwise.	UNCTAD
Access to Land Information index	Log of index (from 0 to 100) that measures aspects of whether the land registry or cadastre have publicly accessible inventory of private and public land; if the inventory is online; if the cadastre shares data about land; and whether there is a publicly accessible land information system or geographic information system.	IAB
Availability of Land Information index	Log of index (0 to 100) which scores countries on 18 pieces of land-related information (for example, plot size, land value, address, previous contracts, existing land claims, tax classification, information on surroundings).	IAB

Table 14: Summary Statistics of Variables

	Obs.	Mean	St. Dev.	Minimum	Maximum
FDI Stock (US$ million), 2007-08	1835	3691.18	21210.30	0	437939
Log of FDI Stock, 2007-08	1111	5.39	3.17	-5.99	12.99
FDI Openness (Log)	83	4.27	0.66	0	4.62
FDI Arbitration (Log)	84	4.08	0.68	0	4.53
FDI Procedures (Log)	84	3.95	0.63	0	4.62
Quality of Institutions, averaged 2002-06	84	-0.23	0.82	-1.74	1.76
Bilateral Investment Treaty	1835			0	1
Log of GDP, averaged 2002-06	84	24.42	2.11	19.77	30.11
Log of GDP per capita, averaged 2002-06	84	7.59	1.48	4.99	10.68
Schooling (Log of Mean Years), 2005	84	1.81	0.56	0.10	2.57
Log of Applied Tariff (Weighted Mean, Manufacturing), averaged 2002-06	81	1.88	0.69	0.00	3.10
Log of Remoteness	84	8.95	0.25	8.55	9.42
Log of Distance	1835	8.55	0.90	4.09	9.88
Contiguity	1835			0	1
Colony	1835			0	1
Common Ethnic Language	1835			0	1
Access to Land Information (Log)	83	3.86	0.58	0	4.56
Availability of Land Information (Log)	83	4.13	0.76	0	4.62

Table 15: Share of IAB Countries, 2007-08

	Inward FDI Stock from OECD (US$ billion)	FDI Inflow from OECD (US$ billion)	GDP (US$ billion)	Population (billion)
IAB Countries*	6773.3	810.6	45200	5.77
World	12500	1855.3	58800	6.62
Share	*54.2%*	*43.7%*	*77.9%*	*87.1%*

Source: FDI figures compiled from UNCTAD and OECD sources; GDP and population from WDI

Note 1: *include 84 out of 87 IAB countries (excluding Kosovo, Serbia and Montenegro)

Table 16: Lists of Countries

*FDI Source Countries (OECD sample)**

1. Australia 2. Austria** 3. Belgium 4. Canada** 5. Czech Republic** 6. Denmark 7. Finland 8. France** 9. Germany 10. Greece** 11. Hungary 12. Ireland** 13. Iceland 14. Italy 15. Japan** 16. Korea, Rep.** 17. Luxembourg 18. Mexico** 19. The Netherlands 20. Norway 21. New Zealand 22. Poland** 23. Portugal 24. Slovak Republic** 25. Spain** 26. Sweden 27. Switzerland 28. Turkey** 29. United Kingdom** 30. United States**

*Excludes Chile, which became OECD member only in 2010.
**Also in the IAB sample of FDI recipients

FDI Host Countries (IAB sample)

1. Afghanistan 2. Albania 3. Angola 4. Argentina 5. Armenia 6. Austria 7. Azerbaijan 8. Bangladesh 9. Belarus 10. Bolivia 11. Bosnia and Herzegovina 12. Brazil 13. Bulgaria 14. Burkina Faso 15. Cambodia 16. Cameroon 17. Canada 18. Chile 19. China 20. Colombia 21. Costa Rica 22. Côte d'Ivoire 23. Croatia 24. Czech Republic 25. Ecuador 26. Egypt, Arab Rep. 27. Ethiopia 28. France 29. Georgia 30. Ghana 31. Greece 32. Guatemala 33. Haiti 34. Honduras 35. India 36. Indonesia 37. Ireland 38. Japan 39. Kazakhstan 40. Kenya 41. Korea, Rep. 42. Kosovo 43. Kyrgyz Republic 44. Liberia 45. Macedonia, FYR 46. Madagascar 47. Malaysia 48. Mali 49. Mauritius 50. Mexico 51. Moldova 52. Montenegro 53. Morocco 54. Mozambique 55. Nicaragua 56. Nigeria 57. Pakistan 58. Papua New Guinea 59. Peru 60. Philippines 61. Poland 62. Romania 63. Russian Federation 64. Rwanda 65. Saudi Arabia 66. Senegal 67. Serbia 68. Sierra Leone 69. Singapore 70. Slovak Republic 71. Solomon Islands 72. South Africa 73. Spain 74. Sri Lanka 75. Sudan 76. Tanzania 77. Thailand 78. Tunisia 79. Turkey 80. Uganda 81. Ukraine 82. United Kingdom 83. United States 84. Venezuela, R.B. 85. Vietnam 86. Yemen, Rep. 87. Zambia.

Table 17: Correlation Among Explanatory Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) FDI Arbitration	1.000													
(2) FDI Procedures	-0.002	1.000												
(3) FDI Openness	-0.020	0.064	1.000											
(4) Quality of Institutions	0.339	0.182	0.109	1.000										
(5) GDP	0.351	-0.077	-0.165	0.580	1.000									
(6) GDP per capita	0.281	0.123	0.103	0.824	0.720	1.000								
(7) Weighted tariff	-0.196	-0.191	-0.140	-0.658	-0.342	-0.670	1.000							
(8) Schooling	0.268	0.052	0.192	0.500	0.423	0.677	-0.558	1.000						
(9) Remoteness	-0.225	-0.276	-0.177	-0.226	-0.120	-0.327	0.342	-0.304	1.000					
(10) Distance	-0.163	-0.163	-0.082	-0.110	-0.066	-0.156	0.187	-0.156	0.620	1.000				
(11) Contiguity	0.061	0.060	0.047	0.146	0.093	0.156	-0.143	0.137	-0.203	-0.238	1.000			
(12) Colony	0.026	0.001	0.038	0.073	0.056	0.060	-0.017	0.018	-0.017	-0.052	0.163	1.000		
(13) Language	0.076	-0.038	0.044	0.095	0.073	0.038	0.000	0.021	0.071	0.128	0.088	0.360	1.000	
(14) Bilateral Investment Treaty	0.156	-0.032	-0.038	-0.016	0.109	0.034	-0.009	0.150	-0.092	-0.228	0.046	0.087	-0.071	1.000

Table 18: Correlation Among WGI Variables

	(1)	(2)	(3)	(4)	(5)
(1) Control of Graft	1				
(2) Rule of Law	0.944	1			
(3) Regulatory Quality	0.891	0.908	1		
(4) Government Effectiveness	0.948	0.943	0.948	1	
(5) Political Stability	0.763	0.835	0.720	0.752	1

Table 19: Construction of the FDI Openness Variable

FDI Openness: This measures the average equity ownership permitted for foreign investors in greenfield investment as well as mergers and acquisitions across 11 sectors, which are themselves averaged equity limits for foreign ownership in 33 sub-sectors listed below. As an example, the Philippines allows 100 percent of foreign ownership in insurance and tourism, but imposes tight restriction in other sectors. In mining, and oil and gas industries maximum foreign equity permitted by the Philippine Constitution is 40 percent unless the investor enters into a 25 year agreement with a minimum investment of $50,000,000. The Constitution also limits foreign capital participation in public utilities (telecommunications and transportation) to a maximum of 40 percent. The media industries (newspaper publishing and television broadcasting) and publishing sector are closed to foreign owners. This gives the Philippines an openness score of 60.06 out of 100. On the other hand, countries that allow 100 percent of foreign equity ownership in all sectors score the maximum of 100. This includes some of the world's least developed countries like Afghanistan, Haiti, Côte d'Ivoire, Rwanda, Senegal and Zambia.

Broad industries	Further disaggregation
I. Resource sector	(1) Mining; (2) Oil and gas
II. Primary sector	(3) Agriculture; (4) Forestry
III. Light manufacturing	(5) Light manufacturing; (6) Food products; (7) Pharmaceuticals; (8) Publishing
IV. Telecommunication	(9) Fixed line infrastructure; (10) Fixed line telephony services; (11) Wireless/mobile infrastructure; (12) Wireless/mobile services
V. Electricity	(13) Electric power generation from coal; (14) Electric power generation from solar; (15) Electric power generation from biogas; (16) Electric power generation from hydro; (17) Electric power generation from wind (18) Electric power transmission; (19) Electric power distribution
VI. Banking	(20) Banking
VII. Insurance	(21) Insurance
VIII. Transportation	(22) Railway freight; (23) Domestic air services; (24) International air services; (25) Port operations; (26) Airport operations
IX. Media	(27) Television broadcasting; (28) Newspapers
X. Construction, tourism and retail	(29) Construction; (30) Tourism; (31) Retail distribution services
XI. Health care and waste management	(32) Health care services; (33) Waste management and recycling

Source: World Bank Group (2010)

Table 20: Construction of the FDI Arbitration Variable

FDI Arbitration: This is measured by the average of two indices related to commercial arbitration. The first one is the Ease of Process index, scored from 1 to 100, comparing how easy it is for investors and other parties to design arbitration proceedings in their chosen manner and conduct fair and predictable arbitration. The second is the Ease of Judicial Assistance index, scored from 1 to 100, comparing the extent of judicial assistance to the arbitration proceedings before, during and after the proceedings.

Indices	Issues measured
Ease of Judicial Assistance	(1) Role of the courts in assisting and facilitating arbitration; (2) Role of the courts in confirming, enforcing and setting aside arbitration awards; (3) Time taken to enforce a hypothetical arbitration award.
Ease of Process	(1) Freedom to choose arbitrators' nationality, gender, qualifications, language, seat of arbitration, use of foreign counsel; (2) Tribunal integrity, that is, impartiality and confidentiality; (3) Choice of arbitration methods and institutions; (4) Time taken between filing of request for arbitration to the constitution of a tribunal.

Source: World Bank Group (2010)

For example, Saudi Arabia has one of the lowest scores (29.5 out of 100) on measures related to arbitration because its laws are not detailed and they impose several restrictions. According to World Bank Group (2010), the arbitrator must be a Saudi national or a Muslim foreigner; in practice, following the Hanbali school of thought arbitrators must be male. The list of arbitrators is determined by the government, hearings must be public, and be conducted in Arabic. Arbitral proceedings must be conducted in accordance with Islamic law and any applicable regulations. There are no legal provisions for court assistance with interim measures and evidence taking during arbitration proceedings. Both domestic and foreign awards are enforced by the Board of Grievances, Commercial Section, which can take up to 56 weeks.

At the other extreme, France is one of the leading forums for international arbitration (scoring 90.3 out of 100). It recognizes international arbitration as involving the interests of international trade. International arbitration does not need to be in writing. French courts strongly support arbitration, upholding an arbitrator's jurisdiction wherever possible. On average, it takes around 5 weeks to enforce an arbitration award rendered in France or in a foreign country, from filing an application to a writ of execution attaching assets (assuming there is no appeal).

Table 21: Construction of the FDI Procedures Variable

FDI Procedures: This measures the number of pre- and post-incorporation procedural steps formally required to establish a wholly foreign-owned, domestically incorporated company. A procedure is defined as any interaction of the parent company or its legal representatives with external parties (for example, government agencies or notaries). The initial number of procedures that apply to locally-owned SMEs are taken from the Doing Business series of reports (www.doingbusiness.org). Additional procedures required for foreign companies are then added, such as the requirement to submit authenticated legal documentation of the parent company, obtain a trade license, or acquire an investment approval. In countries where there is no difference between the requirements for domestic and foreign companies, the list of procedures is identical to that of Doing Business (World Bank Group 2010).

	Issues
What is counted as a separate procedure	(1) Procedures that must be completed in the same building, but in different offices; (2) If the same office has to be visited several times for different sequential procedures, each is counted separately; (3) Each electronic procedure is counted separately; (4) If two procedures can be completed through the same website but require separate filings, they are counted as two procedures; (5) Procedures required for official correspondence or transactions with public agencies (for example, if a company seal or stamp is required on official documents, such as tax declarations, obtaining the seal or stamp is counted); (6) If a company must open a bank account before registering for sales tax or value added tax, this transaction is counted as a procedure.
What is not counted as a procedure	(1) Procedures that the company undergoes to connect to electricity, water, gas, and waste disposal services; (2) Interactions between company founders or company officers and employees; (3) Industry-specific procedures are excluded (for example, environmental regulations are included only when they apply to all businesses); (4) procedures that are not legal, unavailable to the general public, or not used by the majority of companies.

Source: World Bank Group (2010)

For example, Canada scores the highest among the 87 countries (100 out of 100) in requiring the least number of legal procedures (2) and time (6 days) for foreign investors to set up a business. According to World Bank Group (2010), foreign companies can file for federal incorporation or provincial registration via Industry Canada's online Electronic Filing Centre. They require no additional procedure other than the post-incorporation notification within 30 days. At the other end, Venezuela scores 10.5 because it requires 19 separate procedures and 169 days, on average, for a foreign business to be set up. The 19 procedures range from authenticating documents at the country of origin to obtaining work permit for foreign workers.

Table 22: Composite Country Scores of Selected FDI Regulation

Code	Country	**Investing Across Sectors**	**Arbitrating Commercial Disputes**			**Starting a Foreign Business**
		Average Equity Ownership (1)	*Ease of Process Index (2)*	*Ease of Judicial Assistance Index (3)*	*Average of (2) and (3)*	*(Normalized) Number of Procedures (4)*
AFG	Afghanistan	100.00	0.00	0.00	0.00	89.47
ALB	Albania	95.42	40.70	68.50	54.6	73.68
AGO	Angola	72.20	57.30	59.90	58.6	47.37
ARG	Argentina	91.78	72.20	55.10	63.65	15.79
ARM	Armenia	89.10	82.30	27.30	54.8	68.42
AUT	Austria	93.18	83.70	83.00	83.35	57.89
AZE	Azerbaijan	87.77	53.60	37.00	45.3	73.68
BGD	Bangladesh	100.00	67.50	55.30	61.4	63.16
BLR	Belarus	81.66	79.00	84.90	81.95	78.95
BOL	Bolivia	85.16	65.70	54.20	59.95	15.79
BIH	Bosnia and Herzegovina	92.91	57.10	76.30	66.7	36.84
BRA	Brazil	86.18	45.70	57.20	51.45	21.05
BGR	Bulgaria	98.15	64.70	68.60	66.65	84.21
BFA	Burkina Faso	99.50	67.60	67.90	67.75	84.21
KHM	Cambodia	95.95	48.60	46.00	47.3	57.89
CMR	Cameroon	87.67	79.60	64.60	72.1	36.84
CAN	Canada	81.44	84.70	94.00	89.35	100

CHL	Chile	100.00	62.80	74.80	68.8	52.63
CHN	China	64.93	76.10	60.20	68.15	15.79
COL	Colombia	97.27	52.30	18.20	35.25	42.11
CRI	Costa Rica	94.09	59.00	50.90	54.95	36.84
HRV	Croatia	97.22	71.40	52.70	62.05	63.16
CZE	Czech Republic	98.15	88.50	65.80	77.15	52.63
CIV	Côte d'Ivoire	100.00	82.90	55.80	69.35	47.37
ECU	Ecuador	93.61	58.30	59.80	59.05	26.32
EGY	Egypt, Arab Rep.	87.18	74.90	54.20	64.55	73.68
ETH	Ethiopia	50.00	74.00	34.80	54.4	57.89
FRA	France	87.24	86.60	94.00	90.3	73.68
GEO	Georgia	100.00	75.20	53.60	64.4	89.47
GHA	Ghana	99.09	88.50	40.90	64.7	57.89
GRC	Greece	86.31	86.10	48.60	67.35	15.79
GTM	Guatemala	100.00	72.30	58.40	65.35	47.37
HTI	Haiti	93.55	74.90	28.50	51.7	42.11
HND	Honduras	99.07	73.30	59.50	66.4	31.58
IND	India	74.98	67.60	53.40	60.5	26.32
IDN	Indonesia	71.89	81.80	41.30	61.55	47.37
IRL	Ireland	98.15	79.60	75.80	77.7	84.21
JPN	Japan	84.83	77.70	65.90	71.8	57.89
KAZ	Kazakhstan	88.09	70.40	78.20	74.3	63.16
KEN	Kenya	89.96	77.10	56.30	66.7	47.37
KOR	Korea, Rep.	86.68	81.90	70.20	76.05	52.63
KOS	Kosovo	99.09	63.90	27.50	45.7	52.63
KGZ	Kyrgyz Republic	98.15	72.30	61.70	67	89.47

LBR	Liberia	97.14	56.40	42.00	49.2	68.42
MKD	Macedonia, FYR	98.15	74.90	69.70	72.3	78.95
MDG	Madagascar	97.17	74.20	83.30	78.75	94.74
MYS	Malaysia	67.50	81.80	66.70	74.25	52.63
MLI	Mali	94.91	67.50	8.30	37.9	68.42
MUS	Mauritius	96.36	71.20	77.10	74.15	63.16
MEX	Mexico	63.76	84.70	52.70	68.7	52.63
MDA	Moldova	97.68	81.80	60.90	71.35	63.16
MNE	Montenegro	100.00	60.00	46.50	53.25	36.84
MAR	Morocco	84.87	69.50	64.70	67.1	68.42
MOZ	Mozambique	90.45	80.90	22.20	51.55	47.37
NIC	Nicaragua	96.75	73.30	40.30	56.8	68.42
NGA	Nigeria	97.27	82.30	71.50	76.9	47.37
PAK	Pakistan	83.33	68.50	35.50	52	52.63
PNG	Papua New Guinea	n/a	55.60	26.20	40.9	57.89
PER	Peru	99.07	83.30	62.60	72.95	52.63
PHL	Philippines	60.06	87.00	33.70	60.35	21.05
POL	Poland	93.97	82.80	77.30	80.05	73.68
ROM	Romania	98.15	75.20	93.20	84.2	73.68
RUS	Russian Federation	91.24	76.10	76.60	76.35	57.89
RWA	Rwanda	100.00	80.10	73.30	76.7	94.74
SAU	Saudi Arabia	58.79	30.40	28.60	29.5	78.95
SEN	Senegal	100.00	85.10	98.80	91.95	84.21
SRB	Serbia	97.68	71.40	90.20	80.8	68.42
SLE	Sierra Leone	100.00	70.50	20.50	45.5	68.42
SGP	Singapore	88.58	81.80	93.50	87.65	89.47

SVK	Slovak Republic	98.15	85.70	88.50	87.1	68.42
SLB	Solomon Islands	100.00	0.00	0.00	0	57.89
ZAF	South Africa	91.27	79.00	94.50	86.75	68.42
ESP	Spain	89.96	76.10	75.30	75.7	42.11
LKA	Sri Lanka	85.14	71.30	38.00	54.65	78.95
SDN	Sudan	67.00	73.30	67.80	70.55	42.11
TZA	Tanzania	86.86	74.70	39.10	56.9	36.84
THA	Thailand	52.07	81.80	40.80	61.3	63.16
TUN	Tunisia	97.40	71.40	52.30	61.85	36.84
TUR	Turkey	91.86	69.50	68.60	69.05	68.42
UGA	Uganda	98.70	62.90	39.30	51.1	0.00
UKR	Ukraine	88.83	78.10	72.60	75.35	52.63
GBR	United Kingdom	94.96	87.50	94.50	91	73.68
USA	United States	95.23	81.80	75.30	78.55	68.42
VEN	Venezuela, R.B.	81.84	57.10	52.20	54.65	10.53
VNM	Vietnam	68.75	61.80	57.20	59.5	47.37
YEM	Yemen, Rep.	89.19	81.40	44.00	62.7	63.16
ZMB	Zambia	100.00	65.70	77.30	71.5	63.16